

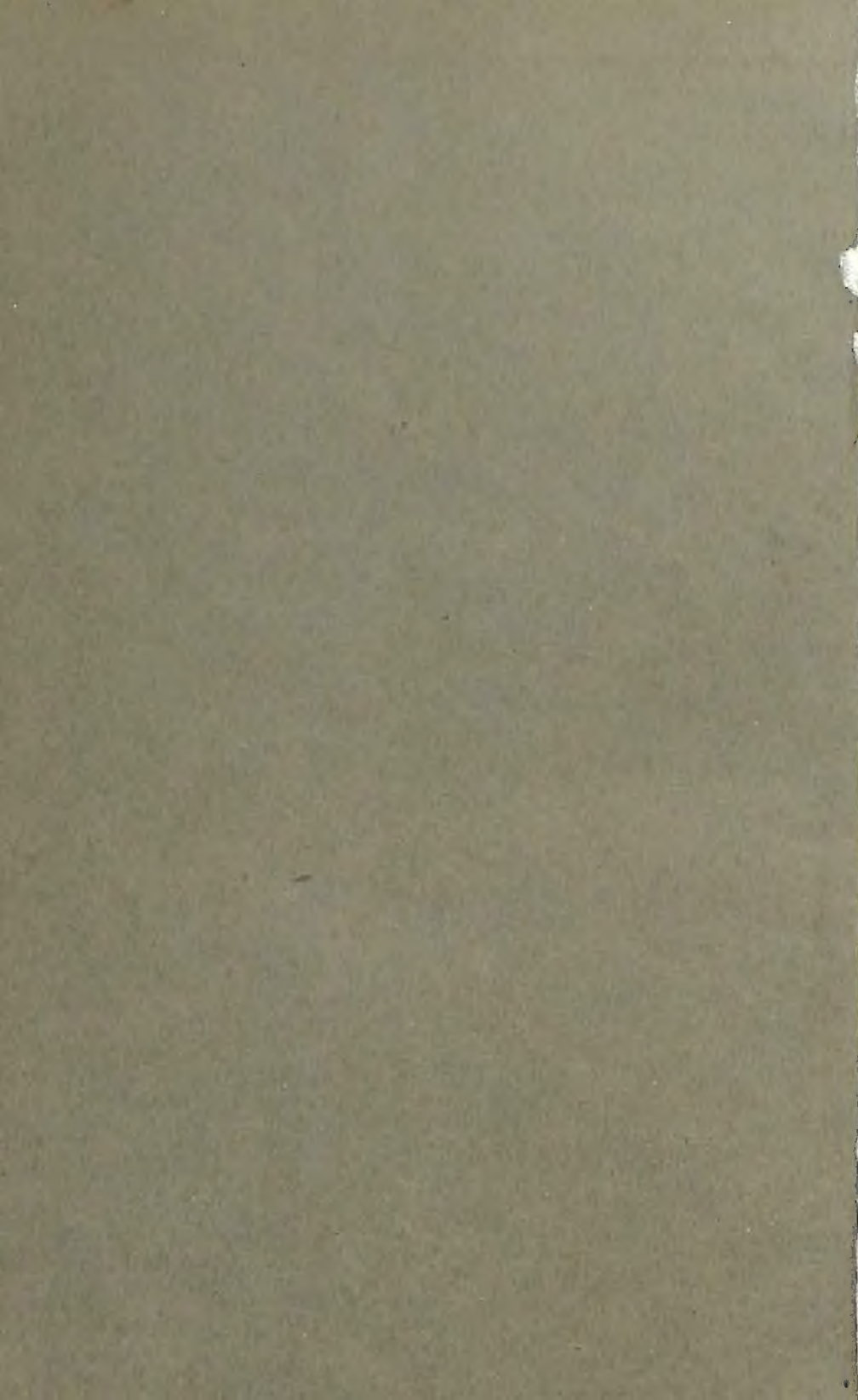
curriculum development and educational technology

**Malla Reddy Mamidi
S Ravishankar**

During the last two decades, while there has been a massive expansion of educational institutions in the country, educational planners and policy makers have laid down more emphasis on the need for improving the quality of education. As a part of the strategy to improve the quality of education, curriculum and educational technology has been introduced as a subject of study and research in a number of universities. This well-designed and comprehensive book discusses various dimensions of curriculum development and educational technology, presents new international experiences, and highlights methodological issues and approaches.

The contributors to this volume are eminent professors and leading educationists from India and abroad. This work should be of immense use to students, teachers and researchers in the discipline of education.

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**CURRICULUM DEVELOPMENT AND
EDUCATIONAL TECHNOLOGY**



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CURRICULUM DEVELOPMENT
AND
EDUCATIONAL TECHNOLOGY

Editors

MALLA REDDY MAMIDI
S. RAVISHANKAR



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Dedicated to Professor N. V. Tirtha

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Our acknowledgement is due to Professor G.B. Shah for permitting us to reproduce the article on 'Programmed Learning and the Classroom Teacher', originally published in *A Handbook of Programmed Learning*, Indian Association for Programmed Learning, Baroda-2.

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Preface

During the last two decades, while there has been a massive increase in the number of educational institutions in the country, educational planners and policy makers have laid more emphasis on the need for improving the quality of education. In our efforts to improve the *quality of education*, there are two important issues requiring greater attention. These are: (a) designing and implementing suitable curriculum (relevant to the socio-economic needs of the country) at all stages of education; and (b) intensive and extensive use of educational technology.

A number of universities have initiated measures to improve the qualifications and quality of teachers, *teaching methods* and curricula as a part of the strategy to arrest the deterioration in standards. Accordingly, they have introduced correspondence-cum-contact programmes, in addition to the regular degree courses, for the benefit of inservice teachers. Interestingly, *curriculum development and educational technology* has become an integral part of the syllabi of the courses in education in most of our universities. A number of projects and experiments are undertaken in the realm of curriculum and educational technology by leading institutions like N.C.E.R.T., S.C.E.R.T., National Institute of Educational Planning and Administration, and Teacher-Training Institutions to determine the desirability, efficacy and applicability of the various techniques, as developed in the West, within the constraints of our resources and unique conditions. In recognition of the importance of curricular reforms and use of educational technology, *technology cells* have been established in some of the universities so as to give the necessary impetus to this area of education.

Paradoxically, while the popularity of *curriculum development and educational technology* as a subject of study is on the

increase, there is a dearth of suitable text books/supplementary readings on the subject. This has, often, forced the students and researchers to run from pillar to post in locating the right book that serves their examination purpose completely. Further, hardly any standard book is available to the teachers and researchers covering the syllabi prescribed by the universities, and documenting at the same time topics of current significance in the area of curriculum development and educational technology.

The objective of the present book, therefore, is to cover the syllabi of Indian universities so that it may serve as a substitute for several books, and provide at the same time additional information over and above the requirements of the syllabi. In order to provide the necessary breadth and insight into the subject to those sections of the people who are not students, some topics that are on the *cutting edge* of curriculum development and educational technology have been included in the last section on *International Experiences*, with a view to stimulating and supporting research endeavours.

The book is primarily meant for students, researchers and teachers in the field of education. It is expected to benefit the students who have enrolled for B. Ed., M. Ed., M.A. (Education), M. Phil. (Education) programmes as well as the researchers pursuing doctoral programmes in curriculum development and educational technology. We, therefore, earnestly hope that this humble effort would be welcomed by the academic community in general and the student community in particular.

This book has been prepared in remarkably short time. This required a great deal of effort on the part of the contributors, all of whom are extremely busy people. We like to thank everyone who has contributed to this volume. Their sustained cooperation and support has been a great source of encouragement.

We are thankful to Shri S.R. Muthukrishnan of CIEFL, for his valuable secretarial assistance in this venture.

We would appreciate hearing from readers about new developments which might be referred to in future editions.

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PART I

General Perspectives

Educational Objectives and the Pupil

Marlow Ediger

The kinds of educational objectives which the learners are to achieve may depend much upon the philosophy of education adhered to by the teachers. The involved learner's philosophy adds input into the curriculum. Pressures from the community at large also modify philosophical thinking pertaining to teaching-learning situations.

Existentialism and the Curriculum

Existentialists tend to emphasize rugged individualism in the curriculum. The involved person chooses and makes decisions in free environment. Ideally, existentialists would say that complete freedom needs to exist for pupils in deciding what to learn (the objectives) and how to learn (activities and experiences). Young learners in general, no doubt, need more assistance in learning as compared to older pupils. The existentialist teacher attempts to develop a learning environment where pupils increasingly make decisions to determine their destinies. Each pupil as a human being needs to make choices. If others make decisions for the individual learner, however, these characteristics of being human may be lacking.

If the learner chooses goals and learning activities in the school/class setting within a very flexible framework, the responsibility rests upon the involved pupil. It, truly, is difficult to make personal choices which are perceived as being worthwhile. The responsibility is great indeed. There certainly is a moral dimension involved in learning. Each decision made, in degrees, has moral components. To choose freely and also be moral, presents problems. To go along with the crowd or to do what is popular may not harmonize with that

which is ethical and good. It can be appalling to realize one's freedom and within that framework be entirely responsible for choices he makes. Others, then, cannot be used as scapegoats for consequences of one's own personal choices and decisions.

Each human being is born and lives his life. He/she did not choose to come into this world. It follows that human beings individually, now, need to determine their own goals. These goals are not given to any one person nor do they come from God. Rather, the involved person by choosing and acting determines his/her own destiny. The consequences involved in the making of decisions can lead to perceived, desirable results. The opposite may also occur—alienation, loneliness, and unhappiness. The natural, social environment does not present rational choices, rather, absurd, ridiculous situations may arise.

Which objectives then might an existentialist teacher emphasize?

1. Pupils need to be guided to choose what to learn (objectives), as well as learning activities to achieve the desired ends. Learning centers may emphasize, in degrees, existentialist thinking. Here, pupils may choose the center and task sequentially to work on. Individualized reading might also harmonize well with existentialist thinking. The individual pupil may then sequentially choose which books to read.

2. There needs to be much pupil/teacher planning in the school/class setting. True input, not manipulation of the learner, needs to be in evidence. The involved pupils must, increasingly, be free to select their own destiny and value system. A teacher-determined curriculum would definitely not harmonize with existentialist thinking.

3. Learners need to study and analyze the human dilemma. Units of study in history and literature, in particular, can offer pupils valuable insight into situations where right and wrong solutions to problems were definitely in evidence. Individuals and groups in literature and history made decisions in which numerous alternative solutions were possible. Learners need to look at the outcomes of these solutions. Were the outcomes rational, irrational, or in between?

4. Pupils with teacher guidance need to notice absurd, ridiculous situations in life. How can moral decisions be made within the framework of these irrational settings? A major objective of the existentialist teacher is to have pupils accept the inconsistencies in society and still attempt to operate morally in the environment.

5. The teacher needs to stress continuously the importance of making personal choices and commitments by each pupil. Committed individuals, who have personal conscience, reflect the thinking of existentialists.

Idealism and the Curriculum

Idealists believe that one cannot know the real world as it is and as it exists. One can, however, seek and obtain ideas pertaining to reality. The perceiver of the use of the senses obtains ideas only about their phenomena.

To an idealist, ideas are more important than materialistic things. A good teacher can communicate ideas effectively to pupils. Mental and intellectual development of pupils is of utmost importance. Thus knowledge of worthwhile subject matter needs to be acquired by pupils. Each pupil should have access to good education in liberal arts and should acquire vital skills like reading, writing, listening, and speaking. A comprehensive study of history, geography, science, art, music, literature and mathematics must be suitably emphasized in the school curriculum.

Pupils may achieve universal ideas from a quality liberal arts curriculum, ideas which are enduring and have stood the test of time. Immanuel Kant (1724-1804), emphasized the importance of each human being treating others as ends and not as means to an end. The Golden Rule, no doubt, is-doing unto others as you have them do unto you. The Golden Rule is stable and not subject to continuous modification and change. It can apply to all persons regardless of creed, origin or religion.

Universal ideas in depth must be sought continuously by the learner. The mind must be creative and flexible to seek universal truths. That which exists in the natural or physical environment does not represent the ultimate reality.

What objectives then might an idealist teacher emphasize?

1. Which assist pupils to think critically and creatively (mental development).
2. Which reflect vital subject-matter that has endured in space and time.
3. Which emphasize learning acquired in liberal arts.
4. Which reflect universal content in relating one human being to another involving ethics.
5. That emphasize individual pupils moving away from being finite to increasingly becoming infinite human beings.

Experimentalism and the Curriculum

Experimentalists believe in experience representing ultimate reality. One can only know that which is experienced in the here and now. What is true today may not be true tomorrow is a key generalization emphasized by experimentalists. Since changes exist in society, new problems arise. These problems need to be identified and solved. The solutions are tentative and subject to testing in actual life situations. What does not work in terms of solutions, needs modification.

Generally, groups of individuals select and attempt to solve identified problems in society. Thus, committee work needs to be amply emphasized in the school/class setting. Individual endeavours are needed to implement school curriculum and the curriculum of life. With groups or individuals identifying and attempting to solve problems, interest and purpose are involved in ongoing learning endeavours. Effort put forth comes from inherent interests of problem solvers. Interest and effort are not separated from each other. They become integrated entities.

Experimentalist teachers might well emphasize objectives such as the following:

1. problem solving objectives being highly significant;
2. data gathering from a variety of resources to solve problems;
3. developing hypotheses in answer to identified problems;
4. testing and revising hypotheses, if evidence warrants;
5. working effectively in committee settings;
6. accepting the consequences of acts/deeds performed and

7. change should be continuously in evidence in the curriculum of life.

Realism and Curriculum

Realist teachers believe that an individual may know reality as it truly is. One does not merely obtain ideas pertaining to the natural or social environment, but each person may actually see, feel, taste, touch, and smell that which is real. An objective reality then exists for each person. The natural or social environment, as it exists, imprints itself upon the mind of the observer. Science and mathematics are two vital curriculum areas for a teacher adhering to realism as a philosophy of education. The natural environment (botany, zoology, physics, chemistry, astronomy, and geology, among others) emphasizes the world of science. Accuracy and precision are vital in the arena of science; thus mathematics can provide numerical descriptions of reality. Other curriculum areas which contain objectified content may well include history, geography, economics, grammar, and even values which have stood the test of time.

A realist teacher does not emphasize change in society as experimentalists do. For example, in the Midwest area of the United States, each year, the following seasons come in ordered sequence—fall, winter, spring, and summer with general related temperature readings. Predictions, are made accurately pertaining to the time of sunrise and sunset. Weather forecasts can be made with some degree of accuracy. The phases of the moon (new moon, first quarter, full moon, and third quarter) can be predicted with a high degree of accuracy.

Realist teachers may then emphasize the following objectives:

1. Pupils should experience, in particular, a quality science and mathematics curriculum. Precise, measurably stated objectives can be emphasized in teaching learning situations. The content of science and mathematics is accurate and verifiable.
2. Other curriculum areas also need to receive adequate emphasis in the school or class setting. Accurate

facts, concepts, and generalizations need to be emphasized which adhere to scientific methods in acquiring content. Opinions might receive relatively little emphasis in teaching and learning. Hypotheses need developing which can be tested.

3. Pupils should be guided to receive exact content as it truly is in the natural/social environment. Replicas of what exists in the environment should be experienced by learners.
4. Learners need to realize that much of what occurs in the natural environment, in particular, is relatively stable and not subject to continuous change. The natural environment, of course, changes in degrees, but changes occur slowly. Objective values which have stood the test of time may also become relevant for pupils to attain.

To sum up, depending upon the philosophy of education being emphasized, a selected set of consistent objectives may be chosen for pupils to achieve. Each philosophical school of thought has unique objectives for learners to acquire. Existentialists emphasize that the individual make moral choices and decisions in a relatively absurd environment. Idealists believe that universal ideas which have stood the test of time be achieved by learners, whereas experimentalists adhere to continual changes occurring in society in which problems need identification and solutions. Realists believe in a relatively stable natural/social environment which learners can know as it truly is.

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Philosophical, Sociological and Psychological Determinants of Curriculum

C. Seshadri

Curriculum constitutes the means through which the ends of Education are achieved. Curriculum refers to the totality of activities and experiences planned by the school with a view to achieve the objectives of education. The justification for the various curricular activities that are normally provided in the school—the academic courses of study, physical education, art, craft, music, drawing and the different co-curricular activities—derives from the objectives of education set for the pupil by the society. Planning of the curriculum should, therefore, begin with a clarification of the objectives which it seeks to achieve. Philosophy of education also helps by providing a better understanding of issues relating to knowledge, which is a central concern of curriculum. Let us consider these issues in greater detail.

Curriculum and Educational Objectives

Whether stated explicitly, or implicitly, the goals of education constitute the reference points for determining the content and organization of curriculum. Now, "What are (or should be) the objectives of our national system of education?" is a question that has generated a good deal of educational discussion in our country. Before considering the different statements of the national objectives of education, it has to be noted that the aims of education in any society are influenced by various factors like the history and traditions of the society, social patterns, economic and political systems and circumstances and also by purely philosophical considerations. The philosophical aspects influencing educational aims

may be taken to refer to belief in certain universal and eternal values reflecting the higher aspirations of the human spirit like justice and honesty, ethical principles governing the concept of the good life and the *summum bonum*. the picture of the ideal society, belief in certain intrinsic values and so on. It is such broad philosophical considerations that give educational aims in any society their general character and contribute towards a general agreement among them. The UNESCO report *Learning to Be* notes that there exists a consensus in the world about the ultimate aims of education in view of their universal applicability. These aims are identified as: scientific humanism, development of reason, creativity, Spirit of Social responsibility, search for balance among the various intellectual, ethical, emotional and physical components of personality ('the whole man') and positive perception of mankind's historic fate.

In our own country various statements of educational aims have been made. Two of the most recent of these are the ones stated in the document *The Curriculum for the Ten Year School—A Framework and the Draft National Policy in Education, 1979*. According to the framework, the school curriculum "should reflect the ethos as also the chief concerns of the country. The values enshrined in our constitution point towards the development of a pluralist, open society and a state which is secular, democratic and socialist in nature. The school curriculum should reflect these aims and values in its structure, content, implied methodology, in fact in its entire design." Earlier, the Education Commission (1946) declared the national objectives as increasing productivity, achievement of social and national integration, acceleration of the process of modernization and cultivation of social, moral and spiritual values. The Review Committee on the Curriculum for the Ten Year School reformulated the objectives of school education as: enabling an individual to acquire knowledge, skills, habits, attitudes and values necessary for a successful performance of his responsibility as a citizen and a rewarding personal life. The Draft National Policy in Education (1979) declared the aim of education to be "the growth of the individual through truthful life without detriment to the welfare and progress of society and our cherished

ideals of freedom, equality and social justice”

Whatever be the stated aim—development of the whole man, knowledge, personality, character—it should be noted that an aim of education does not represent an end-state. The purpose of stating an aim of education is not to point to the existence of a final destination or state which one has to reach but to draw attention to certain processes and principles or procedures; in short; to the *how* of education. It should not be thought that it matters little as to what subjects are taught and what methods are followed as long as the stated goal of education is achieved. For, the goal is not really a goal except in a figurative sense. It is, on the other hand, a disguised directive for teaching certain things and in a certain way.

Secondly, to give point and purpose to the educational enterprise, the general statement of aims like individual development, social progress, citizenship and so on should be translatable into specific curriculum objectives. They should commit their users to definite educational policies and programmes. Or else they remain as vague generalities. Many of the popular statements of educational objectives do not explain or elucidate the tasks implied by them for the educational institutions. Their object appears to be more to arouse certain feelings of approval and admiration. If educational objectives are meant to serve any serious purpose, it is necessary that their educational meanings and implications are made clear and further that their relationship to the curriculum is made explicit. For example, issues like the development of scientific attitude and commitment to moral and spiritual values, secularism, democracy, and equality of educational opportunity require a thorough examination in order to determine their precise implication to concrete curricular programmes. It is the task of philosophical analysis to do this. Philosophical exercise on such general educational aims would bring to surface instances of overlap and superfluity and also cases of mutual incompatibility or essential unworkability on other valid grounds.

Curriculum and Knowledge

The objectives of education sought to be realized through

the curriculum are many. They are believed to constitute a triad corresponding to the familiar psychological analysis of the states of mind into cognitive (knowing) conative (doing) and effective (feeling). Analogously, it has been argued that the curriculum must comprise of: (a) what man knows, i.e., his major modes of thinking; (b) what man does and strive to do, i.e., all crafts and technology; and (c) what man feels, i.e., fine arts like poetry, music, etc. Mahatma Gandhi referred to this aspect as the education of the head, hand and heart. Curriculum objectives, it is suggested, should cater to all these aspects of the human being.

Whatever be the number and variety of curricular objectives, there is no gainsaying the fact, however, that knowledge constitutes the most critical concern of curriculum. This is not to say that the other objectives, for example, those having to do with the hand and heart are to be ignored. It is only to draw attention to the fundamental role of cognition in the process of human development.

Philosophy and Knowledge

Human knowledge—its nature, sources, types—has been a favourite area of interest to the philosophers since ancient times. The result has been the development of an important branch of philosophy, epistemology. Epistemologists have concerned themselves with such questions as What is knowledge? How do we come by our knowledge? Is knowledge one or many? What is the structure of knowledge, and What are its logical categories? and so on. Philosophical findings on these various epistemological issues will surely have either theoretical or practical ramifications on the different aspects curriculum. Especially important for curriculum planning is an understanding of the structure of knowledge and its logical categories. The central concern of curriculum, as we have noted before, is the transmission of knowledge. What aspects of the vast fund of knowledge that mankind has accumulated is to be selected for transmission and on what criteria and how is the same to be organized? The central questions of curriculum planning, cannot be decided except on the basis of the stand we take in regard to the composition of knowledge and its distinct forms.

The Need for Curriculum Planning

Before we consider the specific implications of the structure of knowledge to the organization of curriculum, we should accept the fact that *some* kind of a selection and organization of curriculum content—the knowledge, skills, attitudes, values it seeks to develop—is necessary. This is so because the curriculum content is chosen deliberately to achieve certain specified objectives and also the same has to be transmitted through the formal mode of schooling which sets limits and constraints on what is to be taught and how. If it were possible for people to acquire all knowledge they needed through informal ways, there would be no necessity of formal schooling. Formal education has become a necessity not only because an individual cannot acquire all the knowledge he needs through informal means but also due to the vastness and complexity of knowledge that mankind has come to accumulate and its continued expansion, and the increasing demands made on the modern man for a high degree of knowledge and skills. Thus, the challenge of selecting from this vast fund of human knowledge and of organizing it suitably to facilitate smooth and efficient transmission has to be accepted.

The Subject Type of Organization

Traditionally schools have organized their curricula in terms of disciplines and school subjects. This tradition continues to hold its sway over the school systems the world over. In our own country although successive committees and commissions on education, have made recommendations to include this subject or delete that, they have kept the principle of organization in terms of disciplines or subjects itself (especially at the secondary level) intact. For example, both the Secondary Education Commission and the Education Commission of 1964-66, advocated at the secondary school level a curriculum that comprised of Languages, Science, Social Studies, Work Experience, Art and Physical Education although they differed on the details of organization.

The main plank on which this type of curriculum organization is criticised is that it is vulnerable to misuse by teachers (and students). History bears witness to the fact how the

subjects curriculum has resulted in an overacademic and bookish education, dull and rote methods of learning, rigid water-tight compartmentalization of subjects and fragmentation of knowledge. It is, therefore, argued that curriculum should be organized in terms of the here-and-now needs and interests of the learner. Such a criticism of the subjects curriculum has however, to be taken for whatever it is worth. The disciplines curriculum need not necessarily mean uninteresting and rote learning. It is a matter of pedagogical technique to see that the child is introduced to the fund of human knowledge through the disciplines in a way that the child also enjoys its learning. While it is a good principle to start with the child's real life needs and interests (which can be done even with a discipline-oriented curriculum) one would do well to remember that a curricular activity is an activity deliberately planned to achieve clearly specified objectives. If the activity is not explicitly-oriented to the educational objectives, as in the case of the free spontaneous activities of children, it ceases to function as the means for the achievement of educational objectives and in that sense ceases to be a curricular activity whatever be its other educational merits. It is therefore essential that school curriculum be organized not in terms of the fleeting interests or needs of the learners but in terms of the objective and universal categories of organized knowledge. In making curricular decisions it is essential, therefore, that the curriculum planner takes note of this aspect of knowledge.

The Structure of Knowledge and the Disciplines

Knowledge which refers to the sum total of man's interactions with his environment and his interpretations of the same is not a unified whole but is constitutive of different approaches to the understanding of life. The different approaches to the classification of knowledge suggest different aspects of the process of knowledge acquisition and hence their significance to the curriculum planner. These different classifications and categorizations have, however, been characterized differently by different philosophers as 'disciplines,' 'forms of knowledge', 'realms of meaning' and so on.

A discipline may be considered as an organized body of

knowledge having a logical structure. It is a network of concepts and generalizations which explain the relationships among a body of facts. Man learns by seeing relationships among different events and processes and by generalizing about them. He sees relationships among different facts and events with the aid of concepts and he conceptualizes by classifying. However, thinking does not stop at the point of making single concepts or single generalizations. Just as we link different events to form concepts, we link concepts belonging to a class together and form conceptual networks of systems. It is these conceptual networks that constitute our disciplines: science, mathematics, history and so on.

A discipline is characterized by its structure. First, it has a domain, a field of phenomena with which it deals (*subject matter*). Physicists, Biologists, Mathematicians deal with different aspects of reality although there may be some overlapping among the different disciplines as evidenced by the emergence of inter-disciplinary studies. Secondly, every discipline has its own method and mode of inquiry. The members of a discipline agree upon a set of rules by which to create knowledge and by which to validate it. The rules of one discipline cannot apply to the rules of the other. The rules of science, for example, cannot apply to mathematics. Thirdly, a discipline has a history. {The effect of history or tradition on a discipline is to define in some degree its domain and rules.

Disciplines and School Subjects

Arguing the case for organizing the curriculum in terms of disciplines should not be mistaken for a defence of the traditional watertight subject type of organization. For disciplines are not the same as school subjects. A school subject, as organized and taught, represents an educationist's attempt to translate an underlying discipline into a pattern of activities that will make it available for a student's learning. To the extent it is done successfully it justifies its place in the curriculum. The criticism against school subjects so far has been that they do not truly represent the structure of their parent disciplines. What the student needs is an insight into

the nature of the discipline and what is truly representative of it and not an array of disjointed facts.

Why disciplines?

A discipline, as we have noted before, is not just an accumulation of facts, but an organised body of knowledge characterised by a domain, a method, and a tradition. The structure of a discipline, according to Jerome Bruner, is highly suggestive of the way the discipline itself may be learned. He says: "Every subject has a structure, a rightness, a beauty. It is this structure that provides the underlying simplicity of things and it is by learning its nature that we come to appreciate the intrinsic meaning of a subject." Bruner has given several examples of the structure. They are designed either around unifying concepts of ideas or around central questions and themes. Discipline-structures, thus, are very necessary for efficient learning and school subjects should be constructed in such a way that reveals the structure of the underlying discipline to the student.

'Realms of Meaning' and 'Forms of Knowledge'

Apart from disciplines, knowledge has been classified in terms of *meanings* and *forms*. According to Professor Philip Phenix, education ought to be concerned with engendering essential meanings and curriculum and should be planned with that end in view. He divides knowledge into six realms of meaning, which correspond to the disciplines as follows:

<i>The Realms of Meaning</i>	<i>The Disciplines</i>
1. Symbolics	Language, logic, mathematics, and symbols in art.
2. Empirics	Physical and social sciences.
3. Aesthetics	Literature, music, and art.
4. Synnoetics	Literature, Philosophy, history, psychology, and theology.
5. Ethics and morality	Parts of philosophy and theology.
6. Synoptics	Philosophy, religion, and history.

In another categorization of knowledge, Professor Hirst differentiates knowledge into seven logically distinct domains or *forms*. These forms are distinguished from one another in three ways. First, within the domain, there are distinct types of concepts that characterise different types of knowledge. Second, these concepts occur within different networks, whose relationships determine what meaningful propositions can be made. Third, the domains can be distinguished by the different types of tests they involve for the truth or validity of propositions. The seven forms of knowledge are:

1. Mathematics and formal logic
2. The physical sciences
3. The human sciences, including history
4. Moral understanding
5. The religious form of knowledge
6. Philosophy
7. Aesthetics.

Whatever be the actual classification of knowledge that one accepts, the important point for curriculum-planning is that human knowledge, meaning, and understanding consists of a limited number of quite different kinds and that these are distinguished from one another by their content, subject matter and rules and concepts and methods of validation. A second implication is that education should be concerned both with learning about the differences between disciplines and the relations between them.

Two important principles for curriculum-planning can be derived from the above discussion: the principle of adequate coverage of the disciplines and the principle of achieving balance between the disciplines. A common curriculum for the nation's schools should give due representation to all the disciplines and also avoid excessive or narrow specialization in any one of them at the expense of the others. Knowledge is the central core of our culture, whatever may be the sub-cultural differences, and the task of education is to guarantee the basic minimum of understanding in all these knowledge areas.

Sociological Determinants of Curriculum

Education, sociologically speaking, is a process of transmission of culture. To the sociologist, culture has a much wider meaning than its popular reference. It refers to the total way of life of a society: its knowledge, beliefs, attitudes, values, skills and behaviour patterns—and not just to what is best or most important in that way of life, or to art, music or literature. Culture, to the sociologist, is a natural term that includes everything that is learned and manmade. Schools are formal institutions specially set up for the preservation and transmission of culture by the society. Schools seek to discharge this function through the curriculum, which is nothing but the sum total of learning experiences provided under its auspices. However, it is neither possible nor desirable to transmit the whole of culture to the successive generations through educational institutions. It is not possible because the schools do not have the required resources and time to do that in view of the vast amount of knowledge, values and skills involved. It is not desirable because the society does not want everything preserved and transmitted, but only those aspects of its culture, which it considers valuable and important. Certain ways of life, certain kinds of knowledge, attitudes, values and beliefs are considered so important by the society that their preservation and transmission cannot be left to chance or to informal modes. On the contrary, it has to be done systematically through professional teachers and in specially set up institutions, the schools. Some kind of a selection and processing of culture, is thus necessary to determine what aspects of culture should (and what aspects should not) be transmitted and in what form. It is these selected segments of culture then, that constitute the school-curriculum. Curriculum-planning is about the way these elements are selected and structured. "On what criteria is one to decide what is valuable and worthy of transmission in culture?" "How is one to decide on the priorities?" "And how is one to put them into practice?" are questions that are central to curriculum-planning.

What makes curriculum-planning a very complicated task is the hard fact that no society in the modern world, with the

exception of simple, pre-industrial societies, can lay claim to an all-pervading homogeneous culture. On the contrary, the culture of most societies can be described as an intermixing of several different regional or ethnic sub-cultures, which fuse to some extent but, at the same time, also retain their distinctiveness and individuality. India presents an excellent example of this social phenomenon. It is a vast country inhabited by people belonging to diverse social stocks, cultures, languages, religions and customs. The Indian society is stratified not only on the basis of caste but also on economic class, educational achievement, occupation and sex. The force with which these loyalties draw people to different sub-cultures is great. The problem before the country is how to forge a genuine national sentiment among all its people and bring about emotional and national integration through a national system of education without, in any way, diminishing its cultural variety and richness. In other words, the task before national education is to promote unity in diversity.

The Case for a Common Curriculum

Such a situation demands that national education and its curriculum be built on a common Indian culture. At the same time, it should also take account of the distinct cultural needs and demands of the different sections of the Indian society. This requirement, however, raises a number of questions. To what extent is it possible to identify a common Indian culture to serve as a basis for a national curriculum? What shall be its cultural components? Should national curriculum emphasize the traditional cultural values or values of modernization? What aspects of traditional culture should be retained and what should be removed? To what extent should the different subcultures be represented in a common curriculum? How can the interests of the different linguistic and ethnic groups be compromised with a national educational system? and so on. The Ten Years' School Curriculum, the most recent of our national efforts in the evolution and implementation of a common curriculum built on national culture, has recognized these difficulties and also the need to overcome them. As the framework says: "For a vast country

like ours with its diversity of languages, social customs, manners, mores and uneven economic development, the needs and demands of the individuals and the society will have different pulls on the school curriculum, varying from one region to the other. For the sake of uniformity of standards and of national identity, therefore, it is necessary to develop a common curriculum within a broad framework or acceptable principles and values."

Criticism of the Common Curriculum

The idea of deriving a common curriculum from culture has come under severe criticism by some sociologists of education in recent times. Prof. G.H. Bantock, deriving inspiration from T.S. Eliot, sees culture as falling into two categories—*high* and *low*. The *high* culture has an essentially academic, literary tradition and the *low* culture has an essentially *folk* or non-literary tradition. Compulsory education based on a common culture curriculum has failed, according to Bantock, because we have attempted to force a literary culture down the throats of the masses whose tradition is basically an oral one. His own educational prescription for this situation is to have separate schools and curriculum for participants from *high* and *low* culture groups.

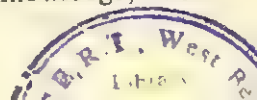
Such a criticism however derives from an assumption that culture can be divided into *high* and *low* and that it is possible to allocate human beings to these two rigid categories, a highly questionable assumption. Common culture-curriculum critics also fear that it would restrict the pupils, achievement to some kind of lowest common denominator without providing sufficient opportunities for the bright and the talented and that in practice it is not possible to organize a common curriculum for a wide range of pupil-ability.

These criticism draw our attention to the fact that the question in actual fact is not whether we should have a common curriculum but how to conceive of a curriculum that suits different individual needs and abilities, that will preserve the identities of different cultural groups, and at the same time promote a sense of unity among them. If the charge against the common curriculum is that it tends to force down on a large section of the people's knowledge, which

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is predominantly academic and literary and which is of dubious value to them, then the criticism is not against the idea of a common curriculum as such, but against a particular type of common curriculum. We, thus, come back to the question: How is one to derive a curriculum that caters to the needs and interests of the different sections of the people while at the same time pursuing worthwhile knowledge, values and skills?

Equality of Cultures

A different kind of criticism on the common curriculum takes the form that one subculture or culture is as good (or as bad) as any other. So, why try to force a common culture on all in a pluralistic society? This is an extreme form of cultural relativity whose educational consequences will be far-reaching. Certain schools have tried to transmit what they have assumed as "culture-free" knowledge, languages, sciences, mathematics, arts and crafts, physical education and so on—which is believed to be needed by one and all for the all round development of one's personality. It is also accepted that those who found it difficult to respond to such curricular treatment, either because of poor home-background or other socio-economic reasons, should be given compensatory education to make up for their cultural disadvantages and deprivations. It has also been taken as axiomatic that there were always some children in schools who were in a particular sense, culturally deprived. The argument that all cultures are equally good, that there is no *high* or *low* culture, and that the schools being middle-class institutions try to force down on the children the dominant middle class culture, makes the very concept of cultural deprivation meaningless except in the economic sense. Deprivation, it is now argued, can have meaning only as an economic notion and instead of taking a patronizing attitude by labelling working class children as culturally deprived, the schools should re-order their curriculum, taking into account the cultural richness and energy of that class of children, who are economically deprived. In the U.S.A., for example, compensatory education programmes for the Blacks have been criticized as just compensating for *lack of advantages, lack of services, or lack of motivation*

rather than for meeting their distinctive educational needs. What is required, according to the critics, is a *Black curriculum* that is responsive to the reality of the Negro child's existence. In a like manner, integration, it is argued, does not mean *uplifting or headstarting* of black kids into a white world, but an acceptance of *all kids and cultures as they are*.

But such a view poses a number of questions to the curriculum-planners. If the most important datum about any student is that relating to his present and likely future membership of a particular social class, what does it imply for the work of the schools? What would be adequate socio-philosophical reasons for schools transmitting different cultures to students from different social classes? What would be the cultural content of curriculum aimed at different social classes particularly in terms of notions like *excellence* or *the best*? As Shukla points out, it is problematic to provide school-college culture supportive of the hitherto underprivileged, or to promote in college the knowledge and skills at which they can be more adept. Even more problematic is the relation of such skills and knowledge to the economy or to the knowledge system as it obtains in society.

Social Class and Curriculum

That school curriculum represented class-free, non-controversial fund of knowledge that was good for all children that came under the fold of the school had till recently been taken for granted. Early sociological research on educational opportunity certainly treated as unproblematic the concept of "what it is to be educated" or the nature of the education pupils failed at. Of late, however, school-curriculum has become the target of severe criticism in the context of the ideals of social justice and equalization of opportunity, the charge against it being that it is invariably conceived in narrow middle class terms and therefore acts against the interests of the children coming from impoverished lower socio-economic classes. Why should emphasis be placed on the assimilation of middle class values? Why should school-success be judged in terms of high scores in language or mathematics rather than in work or social service? And why should children who find it difficult to respond to such 'education' be branded as 'culturally

deprived"? Radical thinkers like Ivan Illich, Everett Reimer and Paulo Freire have taken up cudgels against schools for their bias in favour of middle class and white collar attitudes and their denigration of the attitudes and values associated with the poor. The worst victims of compulsory schooling according to Illich are the poor. "Students, especially those who are poor are schooled to confuse process and substance." Reimer, commenting about the Latin American dropout children, says that although they failed to learn to read "they did learn, however, how unsuited they were to school, how poor their clothing was, how bad their manners were, how stupid they were in comparison with those who went on to higher grades."

Social Learning

How the social class factors affect the school achievement unfavourably of children, especially of the unskilled working classes—has been brought out by many studies. The most well known of these is Basil Bernstein's work in social learning. Bernstein's main finding was that since a child learns his social structure through its language, spoken language powerfully conditions what is learned and how it is learned and so influences his future learning.

A middle class child, Bernstein points out, is capable of responding to, manipulating, and understanding a public language that is structured to mediate relatively explicitly individualized qualifications, as a result of his socio-cultural environment. Because of the different structuring of the lower working-class child's environment, he is limited to a public language only. This radically narrows the extent and type of his object relationships. Thus, the middle class child and the lower working-class child are oriented to different orders of learning as a result of the implications of their forms of language-use. A public language, Bernstein adds, symbolizes a tradition and a form of social relationship in which the individual is treated as an end and not as a means to a further end. The schools by simply substituting a formal language, which is not necessarily a logical, impersonal, emotionally eviscerated language, cut off the individual from his traditional relationships and, perhaps, alienate him from them. And this is the

reason, the critics charge, why working class children do not get 'ahead' in schools. By implication, it means that schools should adapt themselves to this different use of language with all its different implications of the kinds of learning it encourages. The schools are, so to say, faced with a political choice on language. If they maintain their present attitudes, they are acting against the working class.

Several authors on the subjects have reported how the value-orientation of our educational institutions acts against the interests of the poor and the underprivileged classes. According to Malavika Karlekar, the problem of education of the Scheduled Castes is essentially one of socialization in the dominant norms of an educational system based on learning by rote and cramming. According to J.P. Naik, the narrow interpretation of educational quality as achievement in cognitive and linguistic skills associated with the middle and upper classes is one of the main obstacles in the way of educational reform.

The Sociology of Knowledge

Education is essentially concerned with the transmission of knowledge. Hitherto it was taken for granted that knowledge forms which the school sought to transmit through its curriculum—the sciences, arts, history, mathematics and such other disciplines—derived their validity from purely epistemological considerations and had nothing whatsoever to do with social factors. However, during recent times, the whole question of knowledge and curriculum has received a thorough shake-up by a section of educational sociologists who have questioned the 'neutrality' of school-knowledge and called attention to its social dimensions. Deriving inspiration from the Marxian dictum: "In each epoch the thoughts of the ruling class are the ruling thoughts: i.e., the class that is the ruling material power of society is at the same time its ruling intellectual power" they have argued that culture, after all being a social phenomenon, school curriculum, the epitome of culture, cannot have any absolute validity. It is on the other hand, to be viewed as "socially constructed as sets of shared meanings" representative of the dominant power structure of society. Knowing the world is not coming into

possession of a set of truths about the world which is *out there* but a matter of coming to perceive the world in particular ways which are largely determined by one's interactions with a particular historical and social context. What knowledge shall be transmitted through the curriculum and in what form are decided not on the basis of epistemological theories but on the basis of normative or value premises relating to the material conditions of existing social relations. And they are decided in such a way that education serves as a major factor in the production of certain kinds of knowledge, which in turn serve the particular interests of particular societies. Education is, thus, a political act first and foremost and curriculum content is a form of intellectual and political manipulation. Prof. Apple points out that the structural arrangements—the basic ways institutions, people and modes of production, distribution and consumption are organized and controlled—dominate cultural life which includes schools, teaching and curricula. There is a dialectical relationship between the overt and covert knowledge taught in schools, the principles of selection and organization of that knowledge and the criteria and modes of evaluation used to 'measure success' in teaching. Schools create and recreate forms of consciousness that enable social control to be maintained without the necessity of dominant groups having to resort to overt mechanism of domination. Sociologists like Samuel Bowles and Herbert Gintis have stressed the role of economic factors—mobility, Selection, the reproduction of division of labour, etc—on educational institutions and argued that conscious economic manipulation by those in power is a determining element of school-curriculum. Young, Bernstein and others have argued that the structure of knowledge and symbol in our educational institutions is intimately related the principles of social and cultural control in society.

While these views on the social determinants of knowledge and school-curriculum are highly controversial, it cannot be denied that there are highly significant social considerations underlying such questions as: What counts as educational knowledge and why?; What changes should be made in school-curricula and why?; and how can curricula be planned so that pupils will have equal access to knowledge?

The contribution of sociology of knowledge consists in having asked these questions boldly and brought to surface the issues of social class differences in access to knowledge, the validity of streaming and compensatory education and the distribution and stratification of knowledge (why should certain kinds of knowledge be given a higher prestige than other kinds?). But sociology of knowledge alone cannot decide curriculum issues. It simply cannot be that the only reasons for labelling knowledge as high status or low status are social; for there might be other good reasons for the division of knowledge. It cannot also be that subject disciplines are merely social constructs. Actually it is a problematic issue. If it is true that school subjects at present hinder the learning of some pupils, the solution may lie in the reorganization of the teaching of those subjects. It does not necessarily follow that subjects are always bad or that they do not exist. Also, to argue that all knowledge is socially constructed is simplistic. It ignores philosophical views of knowledge and reality other than phenomenology on which the sociology of knowledge is based. While it is true that social factors influence knowledge, it is not the case that they *determine* it.

We, thus, see that there are various sociological considerations like cultural, economic and political that deeply influence school-curriculum—its conception, content and organization. To begin with, curriculum is the device which a society uses to transmit what it considers as the worthwhile aspects of its culture—knowledge, values, beliefs, skills. In designing this device for application in its schools, a pluralistic society has to build it upon the elements that are common to the various subcultures that together make up the total culture of the society besides making adequate provision for the preservation of the identities of the different subcultural groups. Curriculum should also take note of the pulls of different social classes and it should be so designed that it does not act unfair to the interests of the lower socio-economic classes. In the name of transmission of culture it should not act as a vehicle of domination of middle class values. It should also, being essentially concerned with the transmission of knowledge, taking note of the social factors influencing knowledge especially relating to its distribution and stratification

Psychological Determinants of Curriculum

Curriculum, as we have already noted, is a set of learning activities and experiences designed to achieve specified educational objectives and curriculum planning, an exercise involving selection and organization of these activities in such a way that they are geared to the achievement of the objectives within the time and resources available in the school. Naturally, therefore, knowledge of the nature of the learner and of the learning process and the conditions facilitating optimum learning constitutes an important factor—in addition to the philosophical and sociological factors already discussed before—for taking sound curriculum-decisions. For example, what to teach at a given level cannot be answered without relevant knowledge about child-development. The most propitious time to teach any particular subject, the sequence in which it is to be organized, and the pedagogical strategies to be adopted for teaching it cannot be decided *a priori* without reference to the characteristic thought-forms at the various age-levels. In a similar way, how to orient curriculum to child's needs and capacities is an issue that cannot be settled without considering the functioning of intelligence and the development of capacities. Again, how to make school-learning efficient and useful for application in life-situations demands for its satisfactory solution, a sound understanding of the principles of transfer of learning. We, thus, see that a sound understanding of the psychological foundations of curriculum is very essential for every curriculum-worker. While almost all aspects of educational psychology have some relevance for curriculum-planning—for, the central concern of curriculum is the child as a learner and as a person—the way the learning process is explained, the process of human development and transfer of learning have special significance to curriculum. We shall, in this section, discuss these issues in some detail.

The Process of Human Learning

The problem of how human beings learn has been a favourite problem of the psychologists since the early days of psychology and has brought forth various kinds of answers. The theory of mental discipline or faculty-psychology, the earliest of the learning theories, was based on the postulate

that mind was composed of distinct faculties—of reasoning, remembering, imagining and so on—which could be trained separately and developed with constant exercise. Such a theory resulted in a view of curriculum, which justified the inclusion of certain *hard* subjects solely on the ground of their being the best trainers of mind. Later, various other learning theories emerged which can be broadly grouped into two: the associationist or behaviourist theory and the organismic, Gestalt or the field theory. The behaviourist theory was based on a view of man as a collection of responses to specific stimuli. Man learns either by association or connection between contiguous events or by trial and error and conditioning. This theory underplayed the higher mental functions like thinking and insight and concentrated only on lower levels of learning like skill-learning and memorizing. The organismic theories assumed that cognitive processes—insight, intelligence and organization—are the fundamental characteristics of human response to any learning situation. Man learns in part by reacting to selectively organized stimuli and in part by creating new organized wholes. Man is not passive in the face of external stimuli but is an active agent, who learns by seeing relationships between the parts and organizing them into a whole. These theories also imply that in learning the emphasis must be on cognitive process rather than on specific product, on the understanding of principles rather than on meaningless practice.

The different theories of learning result in different curricular implications. The curriculum emanating from the mental discipline-theory tends to be narrow in objectives and unitary in scope, and the aspects of sequence of content and continuity of learning experiences are likely to be ignored. The behaviourist theory with its emphasis on repetition, reinforcement and conditioning (product rather than process) is likely to result in a curriculum, built on learning material arranged in the form of *programmes* and taught through teaching machines. The field-theory, on the other hand, leads to an organization of curriculum-content, that stresses context, relationships and organized understanding and to a curriculum designed to serve multiple objectives representing a wider range of learnings. The influence of this theory can be seen

in many of the modern curriculum-projects in the different school-subjects where the stress is on intuitive perception of relationships and grasp of unifying ideas and concepts. Similarly, the behaviourist theories influenced the arrangement of learning material in the form of *programmes*.

It is now appreciated by psychologists that no one theory of learning is adequate to satisfactorily explain all types of learning. Learning is a complex affair and is of different kinds. It involves not only mastering motor-skills and memorizing information, but also learning feelings, concepts and intellectual skills such as generalizing, scientific inquiry and problem-solving. These processes involve different elements and the search for a common law. To explain all of them may be futile. What is needed by the educational worker is an understanding of the different conditions necessary for the different types of learning. Further, attention of research is now focussed not on the learning organism but on the ecology of learning, that is, learning as it occurs in the educational context of the school. School-curriculum, thus, should provide for varieties of learning and curriculum content should be selected with this end in view. It should also take note of the fact that while learning theories do have differences among them, they also have some common agreement. All learning theories have drawn attention to the importance of the capacity of the learner in deciding who should learn what, meaningful materials and tasks, discovering relationships for better transfer, repetitive practice in the learning skills, etc. and these are of particular significance to the curriculum-planner.

Human Development and Curriculum

How do children grow and develop? What are the characteristics manifested during the developmental process? Under what conditions do children develop in a particular way? These are very important questions for planning the content and process of learning, for development constitutes one of the most important objectives of education.

The idea that growth and development are gradual and continuous and that development stages occur in a fairly orderly sequence is now universally accepted. Another

important idea is the interrelationship among areas of development—physical, social, emotional and mental. These interrelationships are many and the pattern shifts during growth. No individual develops evenly. The unevenness becomes a source of additional difficulties when cultural expectations assume an even development. This is a fact which is of great significance in curriculum planning.

The idea of sequential development has also given the concepts of readiness and pacing. Certain minimum levels of maturity are necessary before certain subjects can be taught efficiently; effective teaching involves pacing teaching to child's maturity. It should not be too early, too much or too fast. This principle has greatly influenced the arrangement and presentation of curriculum content.

The concept of readiness has come under criticism on several counts. Firstly, on the ground that it suggests a passive waiting for a proper level of maturity instead of an active manipulation of experience to enhance the power of the organism to learn. Also, a premature specification of developmental sequences cannot be taken as guide to educational action. Further, the influence of cultural environment in creating readiness cannot be disregarded. The idea of readiness also cannot be patterned rigidly according to age and characteristics of development discovered in one area and cannot be extrapolated to another one. A curriculum gauged to fixed age-level norms of development based on the idea of a fixed sequence may be guilty of under development as well as over expectation. Individual variations in readiness and speed with which they master different tasks should be catered to in the curriculum. A strictly age patterned curriculum with its uniform requirements often fails to accommodate slow learners and late starters. The interrelatedness of the different aspects of development implies that there should be a broader base of diagnosis and assessment in order to determine what curriculum to offer and to whom. Curriculum-decisions are to be made not on discrete measurements and standards but on the constellation of factors determining an individual's readiness to learn. The concept of development suggests that the child and the adolescent are in the process of becoming and so curriculum should aid this process of

becoming instead of enforcing static norms of achievement and progress.

Another notion that is of significance to the curriculum planner is that of a developmental task. A developmental task is essentially a task of learning, which an individual must accomplish in relation to his culture to be a successful, productive and healthy person. The nature of developmental tasks varies according to culture. An important implication of this is that curriculum-planning needs to design, use and control the conditions for learning as well as the content to be learned.

Cognitive Development

Development, as has been noted before, has several dimensions to it—physical, social, emotional, intellectual and so on. Of these, intellectual or mental development is of critical concern to the school, as development of knowledge and understanding constitutes the most important objective of school-curriculum.

The nature of intelligence and the factors influencing its development have been a favourite area of research-interest among psychologists for quite some time and various theories have been put forward. One of the theories that has influenced curriculum to a great extent is that of the Swiss psychologist Jean Piaget. Piaget distinguishes three stages in the intellectual development of the child. The first stage is the sensori-motor stage during which the child is occupied with establishing relationships between experience and action. It is the stage when the child is incapable of performing any *operation*, the pre-operational stage. (An operation is “a means of getting data about the real world into the mind and then transforming them so that they can be organized and used selectively in the solution of problems”.) The second stage is the stage of concrete operations. The beginning of this stage coincides with the beginning of formal schooling and the child now does not have to go about his problem-solving by overt trial and error but can actually carry out trial and error internally. However, the child is constrained to operate only on the immediately present reality, that is what he has experienced or what is before him. It is only when the child

reaches the third stage, the stage of formal operations, that it becomes capable of conceptual thinking and is able to operate on hypothetical propositions and give formal or axiomatic expression to the concrete ideas, that before guided his problem-solving but could not be formally described or understood.

The developmental psychology of Piaget has highlighted the fact that at each stage of its development, the child has a characteristic way of viewing the world and explaining it to himself. The significance of this to curriculum has been well brought out by Jerome Bruner who has declared that any subject can be taught effectively in some intellectually honest way to any child at any stage of development. The task of teaching a subject according to him is one of representing the structure of that subject in terms of the child's way of viewing things. It is a task of translation of the idea in the thought forms of children. These first representations can later be made more powerful and precise more easily because of this early learning. Also, since the intellectual development of the child can be influenced by the environment, the child must be faced with challenges and problems that tempt him to move on to the higher stages of development.

The application of these findings is best seen in some of the modern-curriculum projects which have attempted to present the basic ideas of the different disciplines in the thought-forms of children and gradually deepen their understanding of them by enabling them to use them in progressively more complex forms. The *spiral curriculum* begins with the teaching of the various disciplines but with an intuitive grasp of ideas and use of them and revisits these basic ideas repeatedly as it develops, building upon them until the student has grasped the full formal apparatus that goes with them. The important lesson for curriculum-planning is that curriculum should be built around the great issues, principles and values that a society deems worthy of the continual concern of its members. It should have continuity and development.

Transfer of Learning

Formal education is based on the premise that whatever is taught and learnt in the school gets transferred over to life-

situations and proves to be of functional value to the student. School-curricula must, therefore, lay stress on such content as will promise maximum transfer and develop a knowledge and understanding of matters, which lie beyond what is taught directly.

All theories of learning make assumptions about transfer but different views are held as to how transfer takes place. One view holds that the study of certain subjects assures a general and automatic transfer. It was believed, for example, that the study of Latin improved intelligence, that of mathematics, logical reasoning and so on. This view influenced curriculum-selection a great deal in the past and is still an influential force as can be seen by the advocacy of inclusion of this or that subject on the ground that the subject under question trained this or that power of the mind. According to the second view, transfer is not automatic but is possible only if there are identical elements in the content involved or in the process of training. The emphasis in curriculum, therefore, should be on the teaching of specific knowledge and skills and not on abstract subject matter and general understanding. A third view of transfer holds that transfer occurs not by means of specific identical elements but through generalization of the content or of the methods employed in the learning of that content. The last mentioned view of transfer is backed by the cognitive field theories of learning and constitutes a major influence on modern curriculum-practice. Modern curricula are organized on the principle that understanding of general principles is the key to transfer of learning and that positive transfer depends both on how and what an individual learns. The result has been the throwing away from curriculum of meaningless, non-functional content and inclusion of such content as would best illustrate the nature and structure of the discipline studied. A staunch advocate of this type of curriculum-organization is Bruner. He declares that understanding of the fundamental principles and ideas is the main road to transfer of training. To understand something as a specific instance of a more general case, which is what understanding a more fundamental principle or structure means, is to have learned not only a specific thing

but also a model for understanding other things like it that one may encounter.

We, thus, see that these are various psychological considerations that deeply influence curriculum planning and development. A knowledge of these considerations of which we have discussed only the major ones—the process of human development, the theories of learning and transfer of training—is very essential for curriculum-planning and practice.

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3

Improving Teacher Education Curriculum

C.L. Anand and M.S. Padma

In a country's educational system, the education and training of teachers play a vital role. Any emphasis on quality teacher preparation, therefore becomes complementary to the innovative and experimental challenges of teaching in schools. It is imperative that one can think of a better output in the field of Education if the people, who are instrumental in the task, are properly equipped and have a right type of orientation. Teacher Education curricula, therefore, needs to be continuously improved so as to meet the changing needs of society.

The country has accepted the new educational pattern of the "ten plus two plus three" on national basis. The National Council of Educational Research and Training has worked out new curricula and courses for school education (classes 1 to 10) as well as for the plus-two stage (classes 11 and 12) including those in respect of the vocational courses. The NCERT'S publication *The Curriculum for the Ten-Year School and Higher Secondary Education and its Vocationalization* has been well received in the country. The University Grants Commission is also at pains to restructure the courses at plus-three stage and in fact, some universities in the country have already taken steps in this direction. All this immediately demands corresponding changes in the teacher education curriculum.

But it has been observed repeatedly by several commissions and committees like the University Education Commission (1949), the Secondary Education Commission (1953), the International Team on Teachers and Curricula in

Secondary Schools (1954), the Education Commission (1964-1966), and the working groups set up by the National Council of Teacher Education, that the teacher education programmes in the country have all along suffered from several weaknesses. Practically, all the review committees and commissions have made recommendations for improving not only teacher education curriculum but also various other aspects of teacher education like its link with the main stream of university education, admission procedures, teaching methods and so on. As the Education Commission (1964-1966) remarked, vitality and realism are lacking in the curricula, and programmes of work continue to be largely traditional. Even in a limited area like methods of teaching, the teacher education fails to impress upon the trainee about their usefulness and applicability, as he himself rarely uses any method other than the 'talk and chalk' method. Set patterns of lesson-planning and rigid techniques of teaching are followed in practice teaching regardless of the nature of subject-matter and the objectives to be achieved in terms of behavioural changes. Evaluation procedures, especially those followed for assessing the competence of the would-be teachers, are by and large, subjective and unscientific seeking to find out mainly how successfully factual knowledge has been memorised. This has again been highlighted in one of the recent documents of the National Council of Teacher Education (NCTE), namely, "Teacher Education Curriculum; A Framework" (NCERT, 1978). It states, "It has been observed that, although nomenclatures have changed, such as 'Education' instead of 'Training', the system in practice has, by and large, remained unchanged. The existing system appears to be static and rigid to cope up with the new national goals. It provides the student-teacher very little awareness of the role education can play in transforming the present Indian society into a truly democratic, socialist and secular society that we wish to build up in this country."

A thorough look into the various components of teacher education will help in detecting the areas where improvement is necessary for making the teacher education programme more meaningful.

COMPONENTS OF TEACHER EDUCATION PROGRAMME

Relevance of Teacher Education Curriculum to the School Education Curriculum:

The most important components of an education programme are its objectives and curriculum. Both these are complementary to each other. Changing objectives which go in consonance with the social demands and a country's needs envisage modified contents of education on continuing bases. In fact, curriculum is the pivot on which the entire system of education revolves. Further, with the fast changing knowledge in Science and Technology, the curriculum has got to be highly flexible and dynamic. This view is of special importance in the context of India as our country has different regional rates of educational growth and is characterized by marked geographical, cultural and regional diversities.

The main aim of teacher education curriculum is to prepare teachers who could efficiently carry out the school education programmes. That means, a teacher after his training should be better equipped to achieve the objectives of the school education. One could see that teacher education has to aim at preparing a teacher of the type that the school education system requires. Thus, a modification in the school education curriculum implies a concomitant modification in the teacher education curriculum. As, for instance, the new pattern of 10+2+3 education in our country brings with it the important aspects of vocationalization and social utility of education. The teacher education curriculum has, therefore, to necessarily reflect these aspects.

Course Components

By and large the course components of the existing teacher education programmes in India could be categorised as: (i) theory-courses, (ii) practice-teaching, and (iii) some practical work. If one were to look back into the theory-courses taught several years ago and compare it with that taught presently, it may be found that in most cases there are practically no changes. Many ideas in the field of education have become outdated and may have at best some

historical importance. A new programme should, therefore, be launched inducting the changing ideas and developments into the revised curriculum.

This is equally true in respect of the practice-teaching aspect of teacher education. The approach with which classroom teaching is viewed has changed. Better techniques of the training in teaching are constantly under experimentation in different parts of the world. The framers of the teacher education curriculum would do well to keep track of the findings and results of these experiments in their efforts to modify the curriculum in teacher education not only in theory courses but also in respect of the hitherto neglected aspect of practice-teaching.

It is noted with concern by Indian educationists that the whole educational system is diversified from the society. A student emerging out of the system is most often alien to the society to which he is expected to contribute after his education. This seems to be both alarming and ridiculous. Changes in the school-curriculum have of late been contemplated by introducing what has been termed as Socially Useful Productive Work. But are our teachers capable of handling this new subject area? Are they themselves aware of the needs and aspirations of the community around? The teacher is expected to be an agent of social change. Community expects much from him. He should, therefore, first of all understand the community in which he operates. The teacher education programme should incorporate in its curriculum the aspect of providing for the teacher-trainees to work with the community. This, unfortunately, has not found any place in the teacher education curriculum so far in any definite manner.

There are other aspects which, though small, when put together become a sizable component of the teacher education programme. A teacher is expected to be versatile in many a job, apart from classroom teaching. Many existing teacher education programmes take it for granted that these are learnt by the trainee himself once he is on the job. This assumption has evoked a serious criticism from the heads of schools and others, who expect that the trainee should become an adept in varied jobs expected of him during his training

period itself. The curriculum framers of teacher education have to do some fresh thinking on this aspect of education too.

Attempts at Improving Teacher Education Curriculum

Some attempts have recently been made in the country at improving the teacher education curriculum in view of the criticisms levelled against the existing curriculum and programmes of teacher education.

The National Council for Teacher Education (NCTE), and the Teacher Education panel of the UGC together with the organisations like the NCERT have come out with a document called "Teacher Education Curriculum: A Framework." The document was evolved as a result of the consensus of educationists in India. The same was also accepted in principle in a Conference of the University Professors and Heads of the Departments of Education who resolved to modify the syllabi of the Teacher Education programmes in their respective Universities based on their needs. A number of Universities have since taken up steps to modify teacher education programmes in their respective areas.

The draft teacher education curriculum of the NCTE has resulted in various discussion groups, seminars, etc., to consider its recommendations. There is a general consensus that the NCTE curriculum attempts to bring out the teacher education from its age-old shackles, putting it on a more progressive path. The All India Seminar on Teacher Education held at Jammu in March 1981, reiterated the need for this change when it recommended that "there is an urgent need to implement the National Policy on teacher education as framed by the NCTE." It is worthwhile to have a look at the salient features of the draft curriculum.

NCTE Draft Curriculum: Salient Features

The 'framework' of the teacher education curriculum has accepted 'flexibility' and 'integration' as its base points for much of the further discussion in the document. Flexibility is referred to as: (i) mobility of entry and exit of a teacher-trainee at different stages of teacher-preparation and also mobility from one discipline to the other; (ii) flexibility for

relevance—to develop ‘teacher education modules’* catering to the needs of the states and the local communities within each State; and (iii) flexibility with regard to the continuity between pre-service and in-service education of the teacher. The envisaged teacher education curriculum is expected to bring about integration and interdisciplinarity among theory courses and this integrated knowledge would pave the way to bring about the required changes in the teaching skills or methodology and in the attitudes in the areas of work-experience, health, physical and recreational education, and social service.

The national goals of education are achieved through the cumulative efforts of teachers at all stages—from the pre-primary to the college. This implies a teacher education curriculum model which would run similar for the different stages with common components, though providing for certain modifications as per the needs of a given stage. In the broader sense, the teacher education curriculum would comprise (i) Pedagogical Theory, (ii) Working with the Community, and (iii) Content-cum-Methodology of Teaching School Subjects and Practice Teaching. The draft curriculum proposes weightage to different components as follows: Pedagogical Theory: 20 per cent; working with the Community: 20 per cent; and Content-cum-Methodology and Practice Teaching including Related Practical Work: 60 per cent. This is for pre-primary, primary, and secondary teacher education stages. In the case of higher secondary and college stages, the suggested weightages are 30 per cent, 20 per cent and 50 per cent respectively, giving slightly greater weightage to pedagogical inputs. The guidelines for the implementation of the proposed curriculum are also provided in the draft.

For developing pedagogical courses, separate and special consideration may be given to the local needs and conditions. The courses would generally draw their contents from different

*The document defines the module as a ‘self-contained and independent teacher education programme which, although keeps its affiliation to the overall objectives of teacher education in the country, keeps its focus primarily on specific and well defined objectives of socio-economic milieu present in the immediate environment, i.e. a community village, a city, a state.

natural and social sciences which could provide the trainee with fundamental knowledge and understanding of our social structure and its evolution through ages, national goals, human nature, physical, mental, emotional and social growth and development of the children from neonate to adult age, learning, memory, attitudes, human relations, etc. The draft curriculum suggests a core course "Teacher Education in Emerging Indian society" at all stages of teacher education. This is intended to develop an understanding of (teacher's) obligations to the nation in general and to the community in particular. It also suggests another core course "Core Training Programme", which emphasises common techniques of teaching at all stages of teacher education and is intended to develop essential skills in the trainees. In addition, it suggests special courses to be designed in accordance with the special needs at each stage.

While the pedagogical theory has to clearly reflect our national ideology and the problems and issues faced by our society, it is further necessary that the intending teachers should be thoroughly familiarised with their complex socio-economic environment through actual work situations in society. The rationale for introducing "Working with the Community" in the teacher education programme is two-fold. Firstly, theoretical knowledge based on the pedagogical courses needs to be reinforced and validated by means of actual life situations in community. Secondly, that only through practical training based on participation in community work, could a trainee develop his insight into his sensitivity to and attitude towards common social problems. The draft curriculum further assumes that work situations be 'so exploited as to derive the maximum benefits for the new areas of work-experience, moral-education, art-education, health, physical and recreational education, vocationalisation and environmental studies'.

The organisation of "Content-curriculum-Methodology and Practice Teaching (including Related Practical Work)" envisages that the entire teacher education curriculum should become task-oriented. This programme is to be organised, based on the following comprehensive skills: (i) intellectual skills related to content and methods, (ii) psycho-motor skills for

teaching, and (iii) skills conducive to good human relations for maintaining social climate in the classroom. Evidently, the first essential in this regard seems to be integrating different subjects by way of developing the disciplinary units. This will not only help acquisition of skills referred to but will do so in less time and simultaneously make teaching more meaningful.

The method-courses are generally criticised for lack of both proper content as well as appropriate techniques. However, the method aspect of the existing teacher education programme does not pose serious problems in providing general guidelines for its effective reorganisation. The task-oriented teacher education approach envisages a considerable reduction in the theory portions of the method courses. The NCTE document refers to them as training programmes rather than courses. It envisages 'package programmes' both in respect of core training programme as well as special training programme. This would mean that skills in respect of both the Core Training Programme and the Special Training Programme will have to be identified as a starting point. It is to be noted that core skills are those which are expected of every teacher in the teaching profession, regardless of the academic background and the areas of specialisation. Specific skills, on the other hand, are those which are concerned with teaching different subjects. The second important task after identifying the skills is to develop the envisaged training programme package. This is essentially concerned with evolving modalities for materialising the skills aimed at.

It is to be noted that since practice-teaching is considered an integral part of teacher-education, the training programme packages in question also include practice-teaching as an integral part of the packages. The Core Training Programme may thus be organised in the beginning of the teacher education programme, simultaneously with instruction in pedagogical subjects. The 'package' may include description and demonstration of particular skills followed by practice of same skills by each trainee under stimulated conditions. The trainee's practice-session will be based on mini-lesson plans on each of the course-skills. In the light of the feedback, the

trainees will replan their lessons aimed again at strengthening the core skills. After acquiring core skills the special skills, (as per package) pertaining to two of the school subjects, have to be inculcated. It is to be borne in mind that integration of content, theory for methodology, and practice should permeate the entire web of activities.

Special training programme is also concerned with experience and Socially Useful Productive Work. Since work experience (SUPW) has been included in the school-curriculum, it is logical to have it as an integral part of teacher-education. The NCTE 'Framework' recommends four or five areas of work experience out of which each trainee may opt for any two. Organisation of work experience/SUPW is intended to develop skills of organisation among the trainees in school situation and to develop proper attitudes and skills for taking up such a work. It is to be noted that no special teacher-educator is to be appointed specifically for work-experience. In fact, all members of the teacher training institutions have to be involved in such a task. In imparting this training, the theoretical knowledge has to be integrated with practical work. The NCTE document envisages preparation of lesson-plans for developing the necessary knowledge and skill, demonstration of methodology by the teacher educator and practice by the trainees under stimulated or real conditions.

Again, the Special Training Programme is also concerned with health, physical education and recreational facilities. Like in work experience/SUPW, the knowledge and skills in this area too are essentially intended to enable pupil-teachers to organise activities in schools. Related practical work refers to concrete meaningful work in respect of theory and methodology of subjects of specialisation including evaluation. This may include preparation and use of instructional aids, constructing and using achievement-tests, administering, scoring and interpreting standardised tests. Each institution may draw a list of such activities as may be suited to the requirements of the community and needs of trainees with reference to their subjects of specialisation.

Strategies and Emphases in Improving Teacher Education Curriculum

There is a need to develop strategies in modifying teacher education curriculum suited to our requirements. While the NCTE framework on teacher education curriculum could serve as a guide for this purpose, it may not be right to think of it as the last word in teacher-education. Even while the universities and teacher training institutions are preparing to consider implementation of the document, objections have been raised by certain quarters on the proposed reform. In the All India Seminar on Teacher-Education, held at Jammu recently, it was felt that "the structures and the syllabi suggested by the NCTE need to be re-evaluated and modified to allow more flexibility, diversification, innovations and autonomy to suit different demographic conditions at individual, institutional, departmental, stage and national levels." In fact, a committee of the NCTE itself has proposed a reconsideration of the 'draft'. The NCTE framework is, thus, only a guideline for consideration by the training institutions. It may, however, be noted that any idea of bringing about a change in the curriculum gives place to a volley of questions. What sort of a theoretical orientation do the trainees need? How should the practice-teaching and other practical work be organized? How should the new structure be implemented? These are some of the accompanying questions that emerge.

It is believed that the theoretical aspects that should go into the curriculum can be broadly classified into core subjects and special subjects. The former would include those which every teacher-trainee should necessarily know and study. These are those which are considered to be highly essential so as to ensure mastery over the teaching process. The cultural aspects of the community in which the teacher works and the related social, geographical and other aspects also influence the teaching process to a certain extent. Hence the core subjects could be considered to contain the knowledge of the cultural and social aspects of a given community. This is where the teacher education curriculum requires flexibility. To give an illustration as to how this idea is getting implemented in the teacher education curriculum,

the North Eastern Hill University, in its recent revision of the B.Ed. Syllabus, has introduced as one of its core courses, 'Problems of Education in the North Eastern Region,' the other core courses being 'Teacher and Society,' 'Educational Psychology,' 'Educational Technology,' and 'Study of School System'. Likewise, the special subjects concerned with the teaching specialisation have to deal with the technical knowledge of various methods and techniques that a teacher has to master. The introduction of courses like programmed learning and educational technology also has to be seriously considered, together with those areas concerned with the methodology of teaching. But care has to be taken to see that the teacher education curriculum is not unduly loaded with theoretical content. The present day emphasis is on the reduction of theoretical content by making the programme task-oriented or performance-based. Updating the content and making it relevant to the immediate needs of the school helps a good deal in this regard.

The content and methodology courses in teacher-education should be integrated. This is not an easy task, however. The NCTE document has strongly recommended that the new curricula of teaching various subjects should be thoroughly integrated and the NCERT has provided guidelines for developing such an integrated curriculum, [Dave, P.N.: *A Guideline for Developing Special Training Programme Packages*: (mimeo), 1980], hoping that 'such a curriculum for content-cum-methodology would help integrate content and method in such a way that the dichotomy that has existed between them for such a long time will finally disappear.' All these could be profitably used.

The integrated 'content-cum-methodology' curriculum would not only help reduce the domination of theory-courses in teacher-education but also strengthen the practical skills necessary in the art and science of teaching. However, the purpose will be defeated if the content selected did not correspond to the content relevant at school stage or if content and methodology figured separately in the course-structure.

In the integrated structure, content should become part and parcel of the teaching process. At the same time, it

should be a new content which needs to be taught to the student-teachers as a part of the teacher education curriculum so that it may help him to understand the teaching of each subject better and make him fully conversant with the major concepts of the subject matter he is supposed to handle when he goes to the school as a teacher. This would mean identifying the essential content for the intending teacher, which may be both remedial in nature and desirable for his enrichment. A thorough content-analysis of the textual materials will be required so as to identify the specific concepts to be fully understood by the trainees. This would mean that the type and quantum of content to be learnt would vary from trainee to trainee. It makes the task complicated but the challenge has to be met. Not only that, the content so identified has to be further integrated with methodology. In the context of this type of content, objectives will have to be framed at various levels of learning, suitable lesson-plans prepared (to be executed in micro and live situations), and evaluation-devices including tests such as unit-tests (based on a variety of objective type items) constructed and utilised.

If any single aspect of teacher education curriculum needs improvement, it is that concerning teaching practice. Teacher educators fully agree that the teaching practice should be thoroughly reorganised.

It could preferably be done in three stages. In the first stage of the training, the trainees should learn the different component skills of teaching. This may take, say two to three weeks time. At this stage the microteaching technique is found to be of utmost utility. It is a scaled-down technique where the picture of teaching opens out in its simplest form of analysis before the trainee. In the developed countries like the U.K. and the U.S.A., and in fact in some institutions like the T.T.T.I's in India, this technique makes use of hardware like video-recorders, C.C.T.V., etc. In our country a good deal of research has gone in and it has now been established that the technique of microteaching could as well be adopted with the use of software. The microteaching technique is found to be highly economical in terms of time and efforts. It is also found to be more effective than the

traditional approaches to practice teaching. Instructional materials to various teaching skills have already been developed and validated (Joshi, 1977, Lalitamma, 1977, Passi, 1977). Together with the idea of microteaching goes the concept of simulation. The training of teachers bears a heavy pressure on schools and probably on the pupils also. Batches of trainees can simulate a classroom by acting as pupils, while a fellow trainee teaches. This has got certain advantages. It is helpful for the trainee to overcome the initial inhibitions in teaching. Secondly, it reduces the demands of the teacher-training institutions on the schools. The trainees acting as pupils can visualise what the effect of a particular classroom-behaviour of a teacher would be on the pupils. These could be some of its advantages. The teacher-educators and the trainees could get the maximum benefit out of the technique of simulation.

The second stage of the teaching practice should comprise the teaching at school for one to two months. Once the trainee has been well groomed during the first stage, the ideas and skills in teaching would assimilate further in school situation. At this stage the teacher educator or the supervisor should consider the totality of the teaching process, looking to the most efficient form of combining the different components of teaching. However, as long as the effective techniques of integration of teaching skills are not established, we may depend on the careful observation, critical insight, and the objective feedback of the supervisors to the trainees.

The final stage in the teaching practice should be the internship of trainees in schools. This is to make them familiar with the total picture of a school. This is intended to give them a feeling of how a teacher's life in a school would be, what may be his expectations from the pupils, fellow-teachers, head of the institution, parents, and community at large. This stage could be compared to that of a house-surgeon in the medical profession or a junior lawyer in the legal profession. From this angle, it becomes imperative that this stage is a joint responsibility of the teacher training institutions and the surrounding schools in the community. 'Working with the Community' and 'Socially Useful Productive Work' are yet other aspects of the teacher education

curriculum which should be properly understood and sincerely implemented.

The national system of education as conceived by our leaders during the national movement for freedom and as propounded by Mahatma Gandhi has its genesis in work-based education. In recent years, a number of committees and working groups such as the Iswarbhai Patel Committee, the Adeshiah Committee, the All India Conference of the University Professors and Heads of Education Departments, held at University of Allahabad have all stressed that if education is based on Working With the Community and Socially Useful Productive Work, it could become an effective instrument for personality development and social transformation.

It is agreed that Socially Useful Productive Work and Working With the Community when included in the teacher education curriculum would ultimately result in linking the school with the community. This should include both theoretical and practical aspects. Theoretical contents should highlight the role of the school in community and community development, school and social changes, education and community resources, etc. The practical work may vary in different institutions depending upon the need and available facilities. The programmes should be organised in the content of subject areas such as Health and Hygiene, Food and Nutrition, Shelter and Clothing, Culture and Recreation, etc. Interviews, home visits, group meetings, discussions, demonstrations, etc. may also form part of practical work in the community. While the programme should be conceived as the integral part of the teacher education curriculum, it should be introduced gradually and should not be too ambitious. Simple and clearly understood programmes such as literacy programmes, non-formal education, social service on the campus and in the school surroundings, etc. may be attempted in the initial stages.

Assessment and Teacher Education Curriculum

Taking a Gestalt view of all that is said about teacher education curriculum, certain things show up as supplementary to make it operate effectively. As a teacher is to be groomed

day in and day out of the training programme, it becomes necessary that each act of the trainee has to be monitored by the teacher-educator. This monitoring serves two purposes, one of guidance and feedback, and the other of evaluation. The best type of assessment in the teacher training programme could thus be seen as the internal assessment. It is in fact to be a process-oriented assessment rather than a final product-oriented assessment. But it should be kept in mind that the monitoring of the trainee's work should have its primary objective to help the trainee learn and improve in his work, rather than to assign some marks or grade. The whole training programme should be geared and modelled to fit into the system of internal assessment.

Summing up, a curriculum howsoever reformed, can never be final in its form. It is a continuous process of thinking, modifying and evaluating. New ideas do emerge as a result of thinking, discussion and experimentation. This seems to be the way for finding solutions to oft stated maladies associated with the teacher education curriculum.

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Designing Curriculum for Non-formal and Adult Education

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The 28th All India Adult Education Conference, held in Jabalpur in 1973, declared that "non-formal education comprises any organised educational activity for school dropouts, for illiterate rural and urban adults, for youth, for women or for industrial workers aimed at improving their employment or income-earning potential or giving them general education which in some cases, as desired, may help them to re-enter the formal educational systems." Non-formal education as an approach is being adopted for education of both the illiterate adults in the age group of 15—35 and out-of-school children in the age group 6—14. For nomenclature, non-formal education for the adults is called "Adult Education." The characteristics of this programme are that it is learner-centred, need-based, open-minded, relevant, flexible, diversified and systematic in training and methods and composed of an infinite variety of curricula and reading materials.

The Target Group

The scheme of universalisation of primary education has been prepared to fulfil the objectives of 100 per cent literacy in the age group 6—14. The additional population to be covered in the Fourth five year plan in the age group 6—14 is 320 lakhs. In the age group 6—11 it is 220 lakhs and 11—14 it is 100 lakhs. Out of the additional population of 220 lakhs in the age group 6—11, 100 lakhs children are to be covered through part-time classes. Out of the 100 lakhs population in the age group 11—14, 40 lakhs are to be covered through non-formal education.

The National Adult Education Programme was launched in October 1978, with a view to cover 100 million illiterate adults in about five years. They are not mere statistical figures, but men and women with many over-powering problems and they are poor, undernourished, frustrated, illiterate, ignorant, superstitious, exploited and oppressed. The urge for growth is inherent in them, but is rendered feeble due to frustration. Non-formal education programmes should open the hearts, minds and wills of these learners, stimulate their inner receptivity to rouse and hold their attention and invoke the dormant powers.

Also, they are not empty containers. They have been already filled up with contents of our socialization which is tradition-oriented and contradictory to our processes of modernization.

Concept of Non-formal/Adult Education

An alternative system of education outside the formal system, based on the learners' needs and interests, for the illiterates, drop-outs, push-outs and left-outs/non-starters is termed as non-formal or adult education, depending upon the age group it serves. As such, it should bring about an integrated development in the human being and his environment. It is an effort towards social reconstruction based on justice, equality and self-reliance. It ought to be a vehicle for change in the style of life for the better in all spheres of life. Even the most deprived and weaker sections of a developing society should be able to employ this, consciously and usefully, in improving their lot, irrespective of whether they are rural poor, urban poor, marginal farmer, landless labourers, village artisans and craftsmen, or tribals, etc.

Aims and Objectives

Aims and goals, purposes and objectives refer to some terminal point towards which we intend travelling. Having created a terminal point, we set about identifying the process of getting there i.e. the means or methods. According to Dewey (1964), ends are not at all terminal points, but rather terminals of deliberation and so turning points in activity. Ultimately, the aim of any educational activity should lead an individual

to lead successful lives. Spencer's (1859) informal observation led him to conclude that in order to lead successful lives, individuals needed preparation in fivefold hierarchy of activities, such as: (1) directly self preservation, (2) indirect self preservation; (3) parenthood; (4) citizenship; and (5) leisure activities. This is very much similar to Maslow's hierarchy of needs. Curriculum objectives should be close, quite visible, and accessible at any given point in time. Objectives must be stated in terms of the observable, measurable behaviour expected of the learner, after the programme. 'The greatest advantage of framing curricular objectives in behavioural terms is the clarity of communication that it ensures' (Gagne, 1972). Such a clarity in direction is a necessity in the development of curriculum.

Objectives of Non-formal and Adult Education

The objectives of the non-formal education are:

1. To improve the life of learners in all respects through non-formal and adult-education.
2. To enable the willing children to get entry in formal schools at multiple points.
3. To eradicate illiteracy and make them self-reliant and independent.
4. To remove poverty, ignorance and superstition by increasing their income and creating awareness.
5. To make a better use of their leisure-time.

The first, third and fourth objectives correspond to adult-education, while the second and fifth objectives relate to non-formal education. Thus, both non-formal and adult-education are akin because of the nature and requirement of the clientele and the approach to be adopted.

Concepts of the 'Curriculum'

The term 'curriculum' ordinarily used by specialists indicates roughly a plan for the education of learners and to identify a field of study. But, Beauchamp (1968) proposes that "a legitimate use of the curriculum is to refer to a system within which decisions are made about what the curriculum will be and

how it will be implemented." A curriculum conceived of as "planned learning experiences" is one of the most prevalent concepts among specialists in the field today. Curriculum refers to "all the means employed to provide learners with opportunities for desirable learning experiences" (Krug, 1956). It is reasonable to conclude, that the curriculum as a blue print for education, consists ultimately of the experiences, that it is planned for learners to have. But any definition of curriculum will necessarily vary accordingly to the purposes, which are to be accomplished. The term "curriculum" in its broadest sense refers to all the planned learning activities or experiences provided by an educational programme to a group of learners or target audience. As such it may include objectives, content, learning activities, materials, teaching aids and evaluating techniques and tools. A curriculum, in order to be relevant, must reflect the felt as well as the real needs of the target groups and also be within the framework of national goals for non-formal and adult education programme.

Components of the Curriculum

Kerr points out that any curriculum should have four basic elements, such as objectives, content, method and evaluation. But Hooper adds that these four basic elements do not constitute neat and discrete categories. They are closely interrelated and each component is influenced by and also influences others. Hence they form a dynamic, organic, indivisible and overlapping whole. Curriculum connotes flexible planning and provision of all learning, through available appropriate media, for a definite client group for the attainment of pre-established and realizable objectives.

A curriculum for non-formal and adult-education has to be flexible in timing, duration, place, content, method and media, and the instructor, and it can't be rigid and prepackaged. It should be based on their interests, needs and problems and as needs and interests are changing, curriculum has to respond to those changing needs. It has to use the multimedia approach in order to make communication easier and well understood. Curriculum of non-formal and adult education must address to a definite specific target group such as men, women, urban and rural and the needs of each group which differs. Also, it

should be life-long and lifewide as objectives go on changing.

Objectives of the Curriculum

Musgrave categorises three types of curriculum based on the objectives. They are 'As it now is' (the determined curriculum), 'As it ought to be if it is' to meet the contemporary social needs as generally defined (the adaptive curriculum) and 'As it ought to bring about' some desired change in the existing social structure (the determining curriculum). In the case of non-formal and adult education, the determined curriculum is rejected outright and the adaptive or determining or a combination of the two are accepted. Objectives of the curriculum should conform to the broad objectives of national planning and is expected to change the learners into active agents of social change and not just passive recipients of information. This is similar to the definition of education by Reimer who says that "Education is the conscious use of resources to increase people's awareness of relevant facts of their lives and to increase people's abilities to act upon these facts in their own true interests."

Long-term Objectives of the Curriculum

The long term objectives of the curriculum for non-formal and adult education are:

1. Integrated development of the people and their environment (Physical, Social and Political).
2. Making the learners mature so that they could actively participate in their own development.
3. Help to create a new social order with the active and conscious participation of the community.

Short-term Objectives of the Curriculum

The decision of the short term objectives depend upon the immediate needs of the community and their priorities. The short term objectives of the non-formal and adult education are as follows:

1. To make the target group critically understand their

environments (physical, social and political) and improve their ability to act on it.

2. Increase their incomes through Socially Useful Productive Work, and through cooperative efforts.
3. Improvement of health with preventive and indigenous methods and nutritional improvement.
4. Qualitative improvement of the family conditions.
5. Make them learn functional literacy and numeracy.
6. Participatory involvement of the community for self development and self reliance.
7. To make the adult learners aware of the existing facilities such as primary health centres, *balwadis*, free dispensaries, bank loans, etc. and enable them to make use of such facilities, for their personal improvement.

It is rather difficult to draw a distinction between long-term and short-term objectives because curriculum, as such, is a continuous life long process.

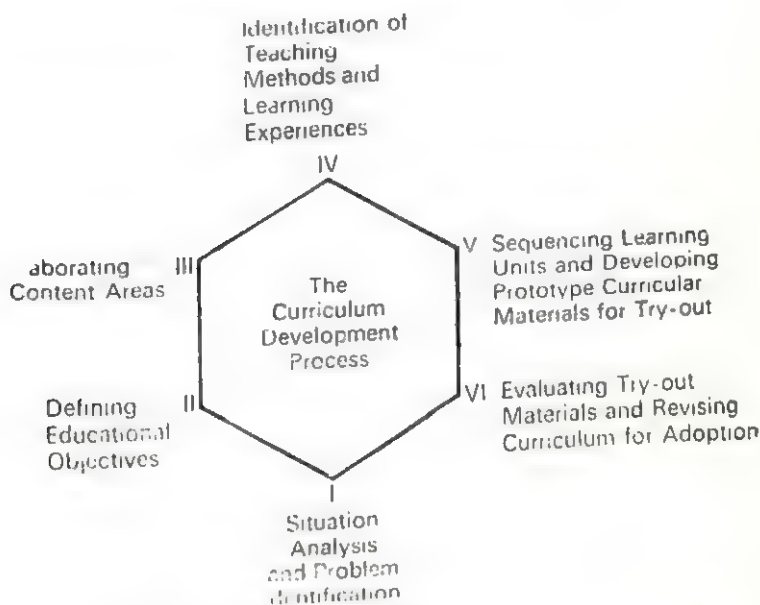
Curriculum Development for Non-formal and Adult Education Programmes

Curriculum development is the pivot on which the success of non-formal and adult education programmes rotates, because they are organised programmes for the learners during their leisure, suited to their interests and needs. Curriculum development for non-formal and adult education is both a dynamic and a continuous process. It has to be dynamic in the sense that it can never be static but keep on changing and growing to keep pace with the changing needs, interests and conditions of the target audience for whom it has been developed. It should be flexible enough to accommodate new ideas and developments if it is to be upto date and relevant.

Curriculum development should be a participatory process. To be effective, it needs the support of all concerned and is not one man's job. It should be a joint, co-operative and collaborative effort of a team of personnel involved in such programmes. Also the expertise and experiences of the staff of government, semi-government and voluntary organisations involved in similar programmes, leaders of the community and the representatives of the target group should be utilised

in the development of a relevant, appropriate and sound curriculum.

Any curriculum development process should follow several sequential steps, as shown in the diagram below:



At the analysis and problem identification stage, a panel of curriculum developers study the characteristics and needs of the target group and the situations in their community through different means such as surveys, interviews, etc. The data collected through such surveys are analysed to find out their socio-demographic profile, their priority needs and problems and the available resources in their community.

Based on priority needs and problems thus identified, general as well as specific objectives are formulated. These are stated in terms of clear, observable, measurable and expected behavioural changes in the target group. Any sound educational objective should contain three essential components, namely, the target group to be reached, the expected behavioural change in knowledge, attitude, or skill and the content or subject matter.

Next step is the selection of major content areas based on the objectives. These are sub-divided into topics and arranged in a logical or psychological sequence, to suit the level of the target group.

The fourth step is the identification of appropriate learning experiences to carry out the objectives in the most effective and efficient manner. They should be interesting enough to stimulate and hold their attention and elicit maximum participation from the learners. They should be practical, utilising the available local resources.

After the identification of such appropriate learning experiences the selected content areas are arranged sequentially, and then they became the content of prototype or sample curricular materials.

In order to determine their potential effectiveness, these curricular materials are pre-tested to a representative and adequate sample of the intended target group.

Finally, the try out results are analysed and interpreted in order to identify the parts of the materials that need to be revised or dropped entirely. After making revisions and modifications they are ready for use.

The process of curriculum development is never complete. Continuous feed-back on the use of these materials and on the changing needs and conditions of the target group should be gathered. Periodic revisions of the materials are made based on these feed-back. Thus, curriculum development for non-formal and adult education becomes a continuous and dynamic process making provision for life long learning.

Curriculum Content

Curriculum content is the core of the adult and non-formal education programme. All other aspects such as learning experiences, the methodology, the teacher-learner interaction, the motivation or interest and the community impact depend upon and flow from it. It is the special function of the curriculum to select and arrange content, so that the desired curriculum aims, goals and objectives are most effectively achieved. An enquiry into the nature and structure of content is a necessary activity for curriculum planners. Hyman (1973) defines content as knowledge (facts, explanation, principles,

definition and skills) and processes (reading, writing, calculating, dancing, critical thinking, decision making and communicating) and values (beliefs about matters concerned with good and bad, right and wrong and beautiful and ugly). The operative curriculum always consists of knowledge, process and value, as they are not in reality separable but overlapping catering to the three domains (cognitive, affective and psychomotor) of Bloom's Taxonomy of educational objectives. Curriculum content is also closely related to curriculum objectives. However well formulated the objectives may be, if the learning units are not properly organised, and if a correlation between objectives and content is not established then the programme will lose its value and credibility with the learners.

DIFFERENT APPROACHES TO CURRICULUM

1. **Functional Approach**

Recently, educationists have recognised the inadequacy of traditional literacy programmes, materials, methods and contents and the need to develop materials suitable to adults and functionality oriented. That is, it should be related to the target-group's life, vocational interest and the day-to-day problems which he confronts and has to overcome.

The functional literacy programme, therefore, had to be oriented to help them to understand, analyse and overcome these difficulties. Hence the materials for learning and the curriculum should be problem and functionality oriented.

2. **Problem-solving Approach**

Among the several approaches for the preparation of curriculum, the problem solving approach is the most useful for adult and non-formal education programmes. Naturally, the learners will not only be interested in solving the problems which they face in everyday life, but also be motivated to participate in the programme due to the direct benefit they derive from it.

The curriculum designed for the learners should consist of the problems that are economical, ecological, social, environmental, etc. and ways of solving them. Hence the participation of the learners is a must and they should be consulted before

the design of the curriculum, during its planning process. It should, therefore, be formulated on the basis of informal discussions, interviews, field surveys and dialogues on certain broad problem areas which are of concern to the adult learners, individually and collectively.

Such an environment based, problem oriented and functionally related approach directly implies that neither diversification and environment are identical in structure and characteristics, nor are the attitudes, approaches, interests, needs and responses of adults in different situations.

Basic Criteria for Designing a Curriculum

The designer of the curriculum should keep in mind the following criteria:

1. The curriculum content must be essentially problem-oriented and hence relevant to their needs in the present horizon and environment.
2. The learners must be able to apply the learned skills and knowledge immediately to solve their problems.
3. It must be action-oriented, linking knowing and doing.
4. It must help the learners overcome the limitations and constraints under which they operate, effecting an improvement in their pattern of living and working.
5. It must awaken the interest of the learners and stir them to an effort towards realising the goals.
6. It must enable the learners to develop a critical attitude towards their problems, reflect over them, analyse them and take appropriate decisions in time.
7. Finally, it must enable them to gain critical understanding of the forces operating in a society and participate in changes that benefit the deprived, poor and weaker sections of the society.

In order to make the content play the determining and germinal role, it is necessary to go through certain operations or steps.

Steps in Curriculum Construction:

1. Awareness of the clearly stated national goals for

- development of policies for adult and non-formal education.
2. Identification of the target groups in accordance with the national goals.
 3. Identification of the communities where target groups are located.
 4. Survey of these communities in order to:
 - (i) study the physical, socio-cultural, socio-economic and socio-political aspects;
 - (ii) study the developmental needs and developmental inputs already effected;
 - (iii) discover the felt and real needs of the target group and the problems and factors inhibiting development;
 - (iv) identify resources, both human and material, in the community and the agencies and structures responsible for development;
 - (v) exploration of the remedial measures to overcome the problems and bottlenecks;
 - (vi) find out the level of comprehension and behaviour patterns of the learners;
 - (vii) to hold informal discussion and dialogue with the prospective learners, community leaders and others interested in the programme.
 5. Analysis of the survey data, thus collected.
 6. Formulation of the curriculum to:
 - (i) propose strategies, both educational and developmental, to fulfil the needs of the target group;
 - (ii) translate needs and strategies into learning objectives and methodologies and then formulate content areas;
 - (iii) delineate tasks to be performed by various agencies, developmental and educational;
 - (iv) indicate educational inputs and targets in terms of literacy, awareness and functionality;
 - (v) identify media to be utilised or commissioned for each content and learning unit;

- (vi) writing of appropriate materials for each learning unit;
- (vii) devising evaluation tools for evaluating the curriculum through the learning experiences provided.

The criteria for selection of a clientele should be determined keeping in view the existing structure, which points out the most neglected sections of society, i.e. weaker sections, be it urban/rural, tribal/harijan and men and women. It is this section that forms the priority target group without whose participation the social change would be incomplete. Focus should be on those whose needs for socio-economic betterment are most urgent. The survey should be inbuilt, based on informal discussion, interview, unstructured questionnaire and dialogue and must be carried out with an open mind in a friendly atmosphere, without any pre-conceived ideas.

Methods/Learning Activities

Meaningful, relevant and appropriate learning activities represent the heart of the curriculum, because they are so influential in shaping the learner's experiences and thus his education. "Learning experiences and not the content, as such, are the means for achieving all objectives besides those of knowledge and understanding" (Taba, 1962). The full range of possibilities for learning activities should be kept within the purview of curriculum designers. "The learning activities refer to basic elements of the teaching-learning situation. The merit of a learning activity is judged only by its contribution to the attainment of curriculum aims, goals and objectives (Tyler, 1957). The three basic criteria for the organisation of learning activities are continuity, sequence and integration (Tyler, 1950).

A curriculum, to be meaningful must conform to national objectives such as social justice, reduction of poverty and inequality, removal of illiteracy, equality of opportunities and economic self reliance as well as group and individual objectives. Hence the approach has to be integrated taking into account physical social, economic and scientific factors which

make up the totality of the problem. Learners are not empty bottles to be filled with matter by people at the top who know what is best for them. Curriculum must take cognisance of the existing stock of knowledge and not bypass or ignore it. It may give curriculum designers a number of entry points. In addition, Paulo Friere's approach to adult education as an instrument of liberation and also the techniques developed by the UNESCO functional literacy programmes have added new dimensions and opened up exciting possibilities for nonformal and adult education. Hence, the methods must:

- (i) stimulate their interest by opening their minds, hearts and will,
- (ii) make them think and develop critical understanding through constant and continuous dialogue and discussion;
- (iii) be diversified, flexible and systematic, adapted to the learner's needs, interests, psychology and learning styles;
- (iv) convey the lessons that are easily understood, assimilated and immediately applied, in their life situations;
- (v) develop favourable attitudes, co-operative spirit and promote active participation of the learners in action-oriented programmes;
- (vi) be multi-media in approach.

From this it is seen, that unless methods and content converge, there is lack of relevance.

Multi-media Approach

In addition to the printed materials whose importance cannot be denied, other learning aids such as flannel graphs, flip charts, role plays, discussion, dialogue, learning games, traditional media of communication like puppetry, shadow play, nataka, jatra, bhajans, villupattu, therukkoothu, kathakalakshepam, folk songs, and entertainment etc., should also be used to make the communication effective, interesting and participatory. Modern attractive and novel media such as radio, T.V. and films can also be introduced if available. The selection of an appropriate media would depend upon the

level of comprehension, interest, the number of participants, subject group and the availability of the media. Learning via the mass media must be an active, participatory process in which learners, their teachers, the producers of the programme and other supplementary materials must work together as a team in acquiring information, solving problems and determining directions for future learning. Sometimes they learn better in concrete kinesthetic situations which are more in accord with the learning styles, specially true of the age group 15 to 25. Learning can be fun through game situations which enables the learners to look at the events critically and make decisions and take *action*, in addition to drawing them out of their gloomy, distressing circumstances, in real life. Many games in our country can be adapted for non-formal and adult education, if they are produced with imagination and intelligence. This multi-media approach for the illiterates, semi-literates and the literates, creates a learning environment, that facilitates and stimulates the whole learning process.

Curriculum and Motivational Techniques

Howe says that "adults learn new social skills and refine those which they already have". But when and how do they do so? Behaviour of an adult is motivated by his needs and interests. Motivation, then, could be the 'why' of behaviour. It is a force that sets in action, directs and sustains it. Motivational materials aim at drawing the attention of the learners to the need for a particular task and hence lend a supportive role to play and should generally precede each stage of instruction and the instructional materials for that stage. Motivation may be generated through mobilising the local resources, folk media and mass media.

Curriculum Evaluation

Evaluation, the final step in designing the curriculum, can be defined in several ways. In its broadest sense it is a systematic assessment of the value or the worth of a programme, a technique or strategy used in field work, educational materials or a situation prevalent in a particular community. In educational parlance, evaluation is defined as the "collection and the use of information to make decisions

about an educational programme" (Cronback, 1963). Evaluation gives evidence of the magnitude of progress or accomplishment of a programme and it is an effort at discovering whether certain activities have led to desired outcomes. The aim of evaluation is to strengthen and improve the programme so that its objectives are attained making optimum use of the available resources—human and material. It should be a continuous and ongoing process so that changes in the objectives, content, learning experiences, materials and methods and media could be made according to the changing situations. It should serve the purpose of feed-back for the learner, organiser and the instructor and hence should be a co-operative and joint effort by all involved in the programme.

What Do We Evaluate?

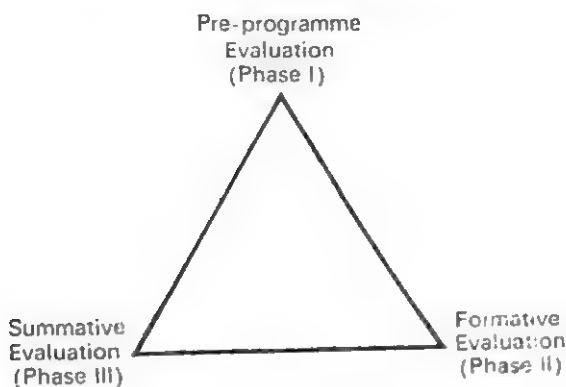
Effort, effect, adequacy, efficiency and process are the five major aspects of a programme that must be assessed in order to ascertain its success or failure. In evaluating effort, the quantity as well as the quality of the available resources should be measured. This is known as 'input evaluation'.

In evaluating effect, the result or the outcome of the efforts made in terms of intended objectives is measured, which is referred to as impact or outcome evaluation. In evaluating adequacy, the effectiveness of the programme in relation to the target group it is intended to serve is determined. In evaluating efficiency, the cost-benefit analysis is measured, whenever possible. In process evaluation, the evaluator is interested to know how and why a programme works or does not work or how the different programme inputs can be manipulated to arrive at desired results.

Thus, evaluation is a continuous process which begins even before the institution of a programme and continues as long as the programme exists.

The process of evaluation may be schematically viewed as follows:

Formative evaluation, also called, in-programme evaluation concentrates on the design and the operational components of the programme with the view of gathering data for assessment and effecting improvements. In fact, formative evaluation



constituted the context, input and process evaluation; whereas summative evaluation or post-programme evaluation is the equivalent of product or outcome evaluation. Based on an on-going evaluation, objectives can be made more realistic, practical, measurable and attainable and content, methods, learning experiences and media changed and improved for the realisation of the objectives. Without such critical evaluation of the content, inputs, process and product, curriculum will lose much of its validity and reliability.

Evaluation is the last but not the least step of curriculum construction, because it serves the purpose of ensuring that the implemented programme is essential for its total effectiveness in such areas as the management of the programme, effectiveness of the material used, impact of the programme on learners' knowledge, attitude, skills and behavioural changes, satisfaction of the immediate needs of the learners and major problems which may need to be considered in reviewing the planning and implementation of the programme for its improvement.

Evaluation can be done in two ways, through (a) a constant monitoring process which may help to introduce necessary changes in the objectives, learning sequences, materials used, media and in learning techniques from time to time; (b) a final evaluation towards the end of completion of the programme to assess the total effectiveness of the programme.

Methods of Evaluation

There are several methods available for collecting information or data for evaluation and they are as follows:

1. Personal interview, questionnaire or schedule
2. Personally distributed or mailed questionnaire and checklists
3. Group interviews
4. Discussion
5. Systematic observation procedure
6. Practical performance, anecdotal records and critical incidents
7. Opinion of other agencies
8. Experiments, etc.

Choice of a particular data collection technique depends upon the purpose of evaluation, the constraints of time and budget, the resources available, educational level of the participants, etc.

Who Should Conduct Evaluation?

In general, educational programmes are evaluated by any or a combination of the following approaches:

- a. self evaluation by the participants of the programmes;
- b. regular monitoring and evaluation by the programming agency;
- c. evaluation by outside evaluators, with given terms of reference;
- d. follow up studies of those who have participated in the programme.

Empirical evidence has shown that total dependences on either internal or external evaluation fails to study the programme in its entirety. Process evaluation can be internal, by programme personnel and product evaluation can be external i.e. by non-programme personnel.

Analysis and Interpretation of Collected Data

The last step in the evaluation process is the analysis and

Model Curriculum on Nutrition

Subject area	: Health and nutritional improvement
Major problem	: Ill health and insufficient and inadequate diet
Sub-problems	: Lack of nutritional knowledge
General objective	: To develop an understanding among adult women about the nutrient requirements of different age groups as it relates to the quality of life of the family.

<i>Contents</i>	<i>Objectives</i>	<i>Methods</i>	<i>Materials/Teaching aids</i>
1. Concept, meaning and importance of nutrition. Deficient food results in unhealthy family leading to low job performance and increased mortality. Balanced diet makes a healthy family. Classification of food nutrients and sources —carbohydrates —proteins	1. To discuss the concept of nutrition —essential food nutrients —functions of food nutrients —sources of nutrients	Discussion with the help of re-source person on the identification of nutritious foods and the importance of balanced food —self learning activities	Charts and pictures on food groups, food samples, illustrated booklets on food nutrients, sources, and functions.

—vitamins and minerals

Functions of nutrients:

—energy giving

—body building

—body regulating

2. Nutrient requirements of pregnant and lactating mothers, babies, infants and pre-school children, methods of nourishment, values, breast feeding and artificial feeding.

To explain the food requirements of different age groups such as pregnant mothers, infants, pre-school children and adults with their relationship to the quality of life. Lecture cum discussion demonstration and paration of balanced diet, Charts on the proportionate ingredients of balanced diet. Cooking utensils and equipments.

3. Meaning, causes and effects of malnutrition, overeating and eating less nutritious foods. Impaired physical and mental growth, ignorance about food values.

To define mal-nutrition and enumerate its causes, implications on the health of the family and its prevention. Discussion, film shows, and role plays. Pictures of healthy and mal-nourished children. Films and projector

<i>Contents</i>	<i>Objectives</i>	<i>Methods</i>	<i>Materials/Teaching aids</i>
<p>4. Planning of a meal and selection of food ingredients on the basis of economy, types, quality and preferences.</p> <p>Preparation of a balanced diet based on the principles, nutrient conservation, saving of time, energy, etc. and different types of dishes, methods of cooking such as frying, boiling etc. and appearance and serving.</p>	<p>To demonstrate skills on the selection, preparation and serving of balance diets.</p>	<p>Lecture/Discussion on meal planning, using pictures of different kinds of food.</p> <p>Discussion on principles of balanced diet preparing using the available resources—human and material.</p> <p>Demonstration and practice cooking and serving, without loss of vitamins.</p>	<p>Guide books on cooking, utensils and cooking facilities.</p>

5. Methods of storing the left-over food. Heat them leaving the lid on and keep in a safe place—if there is no refrigerator, keep inside the refrigerator covering the container.
The left-over food can be utilised by preparing into another recipe or reheating it, to avoid wastage.
 6. Principles and methods of preservation of different foods by drying, canning, fermenting, bottling, etc.
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| <p>Demonstration of utilising left-over foods as it reduces food expenditures.</p> | <p>Discussion with experienced women on storing and utilising the left-over food.</p> | <p>Leaflet on the storage and utilisation of left over foods.</p> |
| <p>To demonstrate skills on food preservation</p> | <p>Group discussion on the principles and ways of food preservation.</p> | <p>Utensils, ingredients and chemicals for demonstration of preservation.</p> |
| <p>Principles and methods of preservation of different foods by drying, canning, fermenting, bottling, etc.</p> | <p>Self learning by preserving fish, coconut, pickles, juices, etc.</p> | |

interpretation of data collected. Information collected through surveys should be classified and condensed to allow easy and meaningful interpretation. It has generally been recommended that the quality of curriculum materials be assessed with respect to the following:

- a. suitability for the age, ability, maturity, level of comprehension and experience of the learners;
- b. relevance and likely contribution to the achievement of programme objectives;
- c. relevance to the interest and needs of the learners;
- d. sequencing and their adjustment into the rest of the curriculum.

When Do We Evaluate?

Evaluation is a continuous, on-going and inbuilt process and should hence, be carried out, before, during and after the completion of the programme. Pre-programme evaluation provides base line information on knowledge, attitude, skills, behaviour patterns, needs and interests, strengths and weaknesses of the learners. It gives an idea about the areas to be emphasised in the programme with a clear indication of the loop-holes, problems encountered and solutions suggested to attain the programme objectives. On the other hand, terminal or post-activity evaluation enables us to attribute the amount of change (if any) in the learners' knowledge, attitude, skill and behaviour to programme efforts. It also determines whether the objectives of the programme have been attained.

Conclusion

Properly planned and implemented non-formal and adult education programme with a well designed curriculum can not only lead to a revival and revitalisation of the people's culture, it can also level it up, enrich it, and make it a stimulant for social action. Proper training should be given for planners, educators, curriculum designers, material makers, supervisors and evaluators of non-formal and adult education and the training institution, both Government and non-government, should be properly equipped, staffed and oriented to meet the expanding and varied demands and needs of non-formal

and adult education. Based on the above mentioned criteria, a model curriculum on 'Nutrition' for adult women has been prepared and attached in this article.

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Mass Media in Adult Education

K. Sivadasan Pillai

Education of the adults can be of different kinds. For those who did not or could not get themselves educated while they were young and who now realise the need for education join adult education centres or engage private tutors for becoming literate. There was a time when only a few who belonged to the higher strata of society were allowed to attend schools. Many dropped out of the schools due to conditions beyond their control and relapsed into illiteracy in due course. Some others were pushed out by the faulty methods adopted by the teachers. They too became illiterates as time passed. These adults need education, rather literacy to begin with, and if necessary continued education to keep abreast of the times. This is adult education in India.

In the affluent countries, especially where illiteracy is not a big problem adult education has a different connotation. There it is continuing education of the adults in one's own branch of learning for becoming up-to-date or in allied branches of learning for equipping oneself more to lead a better life. Hence the approaches have to differ in the developed and developing countries.

In a country like India, eradication of illiteracy is of paramount importance and for that non-formal measures alone will help. Nonformal education is life centred as well as client centred. The needs of the learner are given highest priority in fixing timings as well as preparing the curriculum.

The different stages in the implementation of any adult education programme of the nonformal type are:

1. Create an awareness on the importance of and need for education among the illiterate adults.

2. Create a conducive atmosphere for launching a programme of adult education with the help of the government, semi-government and voluntary agencies already in the field.
3. Motivate the learners, workers and in general the community to co-operate with the programme in an effective manner.
4. Collect necessary teaching learning materials for use in the centres and distribute them to the agencies or instructors as the case may be.
5. Organise orientation and training programmes for the workers prior to the launching of the schemes and in service courses regularly.
6. Plan institutional structures and implement the same effectively.
7. Do monitoring and evaluation according to previously prepared plans.
8. Prepare follow-up materials in the form of neoliterate books and periodicals.
9. Organise rural libraries or start neo-literate corners in existing libraries.
10. Create a new vigour in the life of the people, especially the 'dalit proletariat', and involve them in developmental activities.
11. Plan and execute action plans for the welfare of the community and implement them with the co-operation of all sections of the society.

In such an adult education programme teachers and students do not exist. There are only animaters/instructors and learners. This process embraces the society at large in addition to those two sections who are directly involved. Hence this is also conceived as mass education or people's education. There is self learning as well as exchange of ideas and action between individuals and groups. As such, mass media becomes inevitable in people's education and in particular, in adult education.

Print media, broadcasting, cinema and folk art forms are the major categories of mass media. The first covers daily newspapers, weeklies and monthlies, occasional issues like

souvenirs, pamphlets, wall papers, bit notices and books—big and small with or without illustrations. Radio, Television and INSAT are the important ones under the second category. Sound and documentary films, slides and movies form a part of mass media. Folk arts represent the culture of the past of different societies and races living in different parts of the country.

Print Media

This media is very useful for all except the illiterate who cannot read and comprehend written or printed word. Reading aloud by people for others, can also be used in adult education. Kerala has an established library movement with a network of about 4,500 rural libraries. Karnataka comes next in rank. These show the spread and use of print media among people. In the early morning hours anyone who passes through the streets of Kerala will see groups of people in tea shops and stationary shops reading newspapers aloud and discussing them at length. Even illiterates gain general knowledge simply by listening.

Pictures and illustrative drawings can be effectively used in teaching the adults. Graphical and pictorial representations communicate better than alphabets. The print media has a unique place in conscientizing people as well as in continuing education. The invention of print media has not only accelerated the culture of mankind, but also brought in cultural revolutions resulting in rapid scientific and technological advancements.

The print media is the cheapest among the mass media and hence very popular all over the world. It is also becoming expensive but compared to others, it is an easily accessible medium.

The fact that the newspapers and periodicals do not give sufficient support and publicity to the educational and developmental programmes, is rather alarming. While publicising unnecessary items which tempt people towards anti-social activities, the media is negatively influencing the community. The partisan approach is another weak point. Headlines are given even for minor affairs or incidents of a political nature, whereas articles, of longlasting value, ideas, messages etc., are

often left out. Distorted version of news items also occur in some newspapers. Some are even termed 'yellow papers' which are the 'spokesmen' of a section of the society. Theft, murder, rape, etc. are given wide publicity. It is true that these can rouse the conscience of the public but in practice, as in the case of films, these tempt teenagers and frustrated individuals to try them out themselves and then they get into trouble.

The print media has great scope in nonformal education. The more people become literate and the more they have the tendency to read newspapers and periodicals. Reading rooms and libraries will flourish and the book trade will improve considerably. The existing writers' co-operative societies will flourish and new ones will emerge. Hence it is expected of the print media to extend full support for adult and nonformal education.

The press has a major role to play in creating awareness among the public on the importance of literacy and education. The elite group can be persuaded to engage themselves in some kind of adult education activity—running of classes, motivating people, preparing teaching-learning materials, writing books for neoliterates, evaluating and arranging follow-up programmes, etc. A seminar on the effective involvement of mass media in adult education resolved to request all newspapers and periodicals to allot at least half a page every week for neoliterates. How far this will be adhered to, depends on the pressure people exert on them.

Broadcasting Media

The advantage of radio and television is that it can reach maximum number of people in the shortest span of time. Effective communication can be made even with illiterate people through this technique. It is however shortlived when compared with the print media. Radio can simultaneously announce programmes and reach all adult education centres effectively. The programmes can be taped and reserved for later use. What is heard need not last long in the minds of people. This understanding can be ensured through books and periodicals. Television can be of more use when the entire India has that facility.

India has reached a stage when it could launch its own satellite for communication purposes. The SITE programme was an experiment which helped us to launch more important schemes. The launching of APPLE raises our hope further in the realm of communication. Radio listening groups have to be organised in all villages attached to adult education centres. Radio rural forums can activate the radio programme through discussions before and after each programme. Radio kiosks help rural people. Now that the fee on 1 & 2 band radios has been lifted, people will use radio more than ever before.

Effective Programme planning is an essential component in the success of the radio. Programmes should be of interest to all and so fixed that they can be listened at a convenient time. It should aim at not only giving relaxation and pleasure to people; it should also convey news and pass on relevant information and knowledge to all. Experts should take part in programmes if those have to be made meaningful to adults.

Janatha Radio transistors should be produced at cheap rates and made available to the economically poor people. In literacy centres tape recorders should also be supplied so that programmes could be recorded to be used on later occasions.

Cinema

A powerful medium in itself, cinema has gained a place of prominence. It is amusing as well as communicative. Feature films are of great use but are not preferred to ordinary films. Purposive films are needed, but are not sufficient in number at present. Cinema can appeal to both eyes and ears simultaneously. The lasting influence of cinema has to be utilised effectively in adult education. The cine stars are admired by the people and are held as models by the youth, teenagers and adults alike. Their fashions are reaching the markets quicker. Thus the cine stars can motivate people to render and receive education.

For the preparation of films, technical experts, Artists and Educational (nonformal) experts should sit together, discuss and finalise the script and scenes. A mistake or carelessness on any

body's part will ruin the whole film. The expenditure involved in the production of films is very high. Projectors also cost much. Cheap projectors have to be made and supplied at the rate of one for a group of 10 centres or so.

A new system of award to the best film conveying the message of literacy should be instituted. The emphasis on star value should go and in its place message and entertainment orientation should be stressed. As in the case of children's films, a society for neoliterate films should also be formed.

The influence of films on laymen is beyond question and this has to be effectively used to the maximum.

Folk Arts

As adult education is mainly meant for the weaker sections of the society, folk arts form a powerful medium for imparting such education. Numerous folk art forms are prevalent in different parts of the country. They can be used for communicating with local people. Local learners can be encouraged to display their art forms. The influence of such art forms is immense and they are dear to them.

Regional priorities and peculiarities have to be taken into account in choosing art forms to be used for non-formal education. These are more effective than public speeches or corner meetings in conveying messages and depicting desired behaviours.

Exhibitions form another category. Exhibitions can be arranged at the time of local festivals, school anniversaries, festive seasons. They are very educative, and have lasting influence on the people and can be held regularly at periodic intervals.

Thus, in brief, audio-visual media have an important role to play in nonformal adult education. The effectiveness depends on the choice of media and its presentation. Expertise has, hence, to be developed among adult educators and practitioners on the preparation, selection, administration and follow-up of the media as part of the adult education programme. Medium is equally or more important than message or content of communication. This is sometimes lost sight of and causes a lacuna.

Both hardware and software are needed in education,

whether it be formal or nonformal. Educational technology has advanced so much that it cannot be avoided. The judicious and careful use of the same is bound to yield better results. Hence the importance and urgency of commissioning all available mass media in adult and nonformal education, with an adequate understanding of the merits and demerits of each.



Streamlining Curriculum Administration

B.P. Lulla

During the last few years, the question of curriculum in schools has been carefully reviewed in all the countries. Such a critical review has been necessitated by many reasons. First, every country now considers education of children as 'the national investment' which brings future returns. The amount spent on education is to be realised in terms of improvement of community life and growth of individual calibre. Second, there is a movement pioneered by educational thinkers and researchers towards 'the rationalisation of educational system'. It seeks to make all the educational programmes goal-oriented and need-oriented. In other words, curriculum of the educational institutions at all levels should be objective-based and meaningful. Any programme that lacks application value or does not help in developing any understanding, attitudes or skills is to be apprehended, rejected and reconsidered by the curriculum planners. Third, there is an inevitable impact of 'the advancement of science and technology' on the educational system of our age. Every country is concerned about the scientific and technological progress and better utilization of natural and mineral resources. This implies that more scientists and technologists should be produced from the educational institutions and all the citizens should be equipped with scientific outlook and technical skills. Hence, the school curriculum has to give due weightage to the study of sciences and the teaching methods are to be reoriented to develop scientific thinking among children.

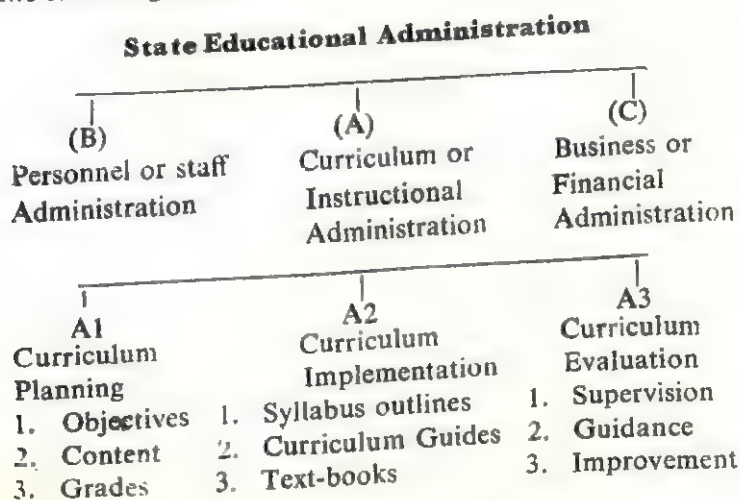
In view of the reasons mentioned above, there has been a ceaseless activity on the part of the educational administrators and the State Departments of Education to revise and re-organise school curricula. More attention is being given to

the problems of curriculum-organisation and administration in every developing country. In India also, there is an urgent need for streamlining the machinery and procedures of the curriculum administration, so that the wastage and inefficiency in the educational programmes could be avoided and better returns on each rupee invested in education could be assured.

Concept of Curriculum Administration

In recent times, the literature on the theory of Curriculum Development as an important branch of the discipline of education has increased considerably. New terms like 'Curriculum Construction', 'Curriculum Reform', 'Curriculum Research', 'Curriculum Organization' and 'Curriculum Administration' are now commonly used in the textbooks of education. These terms are often used very vaguely and are still in the process of being precisely defined.

This chapter seeks to clarify the concept of Curriculum Administration by outlining its major dimensions as shown in the following illustration.



Thus, curriculum administration is the main concern and integral part of the 'State Educational Administration'. The existence of the State Departments of Education is justified if they can successfully implement the educational policies and programmes for schools, maintain high standards and improve

the quality of education at state level. The other two phases of educational administration, viz. personnel administration and financial administration are subservient to the curriculum administration, which is the main obligation of any State Department of Education.

Curriculum Administration has three phases when viewed as a total process. The first phase consists of curriculum planning which involves the following decisions:

- decision about objectives of teaching courses, grade-wise and age-wise;
- decision about the content areas in each subject in terms of the overall educational objectives; and
- decision about the gradation in courses and subjects in terms of children's aptitudes, interests and abilities.

The effectiveness of curriculum planning will depend upon two basic questions: (1) Who are involved in making the above decisions?; and (2) How are the above decisions made by the Department?

If curriculum is planned co-operatively by those who are affected by it and if such a planning is based on the educational data regarding child's rate of growth as well as his social environment, there is greater likelihood of the educational programme to be effective.

The second phase of the curriculum administration involves the following decisions:

- decision about the size, content and type of syllabus outlines to be provided to schools;
- decision about the type of detailed guidelines regarding the content areas of the subjects, teaching methods, instructional materials and resources to be used by schools and teachers; and
- decision about the type and size of text-books to be used by pupils of different grades.

The effective curriculum implementation depends upon the quality of subject syllabuses, teachers' handbooks and kind of textbooks prescribed by the *State Department of*

Education. Unless there is an effective communication of ideas and an adequate guidance given to teachers through the materials produced by the department, there can hardly be a successful execution of the educational programme in schools. Again, such materials are to be produced by the educational authorities in close co-operation with the teachers, so that they feel involved in the process of curriculum administration.

The third phase is the most important one as it feeds back the first two phases. It helps in the review and reorientation of curriculum planning and curriculum implementation. It involves the following decisions:

- decision regarding the purpose and procedure of evaluation through supervision of instruction or inspection of school programme as it is commonly understood.
- decision about the type of guidance and direction given to schools after the evaluation of their programmes.
- decision about the methods and means of improvement in schools whose programmes are evaluated.

Thus, the effectiveness of curriculum evaluation depends upon the quality of inspectors appointed for evaluation, their relations with schools and their methods of work. If they can provide the right kind of instructional leadership to schools under their supervision and control, there is no reason for ineffective curriculum administration.

Present Position in India

Keeping the above aspects in view, one can easily assess the present set-up of curriculum administration in India. Some assessments have already been made by the expert education commissions ever since India became independent. In 1952, the Mudaliar Education Commission pointed out the defects in the various phases of curriculum administration and recommended significant measures for reforms.

The Kothari Education Commission also made some observations on the school curriculum, which are as follows:

“Against the background of the striking curricular developments that are taking place abroad, the school curriculum in India will be found to be very narrowly

conceived and largely out-of-date. Education is a three-fold process of imparting knowledge, developing skills and inculcating proper interests, attitudes and values. Our schools (and also our colleges) are mostly concerned with the first part of the process—the imparting of knowledge—and carry out even this in an unsatisfactory way. The curriculum places a premium on bookish knowledge and rote learning, makes inadequate provision for practical activities and experiences, and is dominated by examinations, external and internal. Moreover, as the development of useful skills and the inculcation of the right kind of interests, attitudes and values are not given sufficient emphasis, the curriculum becomes not only out-of-step with modern knowledge, but also out of tune with the life of the people. There is thus an urgent need to raise, upgrade and improve the school curriculum" (*Report of the Education Commission, 1964-66, p. 184*).

Thus, the remarks of the Kothari Commission clearly indicate that there is something wrong with the whole process of curriculum administration in India and that attempts should be made to reorient the planning, implementation and evaluation of school curriculum. The commission strongly recommends *rethinking* and *research* in curriculum at different levels, better preparation of instructional materials by the State Department of Education and continuous growth of teachers through in-service training programmes.

An objective and careful analysis of the present situation in the State Departments of Education reveals the following drawbacks in the process of curriculum administration.

1. In most States, there are no Special Administrative Officers in-charge of curriculum administration. Even the new concept of curriculum administration as an integrated process has not yet been realised at the departmental level.
2. There is a lack of adequate staff in the departments and the duties and responsibilities of curriculum administration are not fully carried out.
3. Much attention is paid to the minute administrative details and procedural matters under the bureaucratic

system and the main purpose of educational administration, viz. curriculum administration is lost sight of.

4. Planning of curriculum is not done as frequently as desirable from the viewpoint of the evolving educational needs of society.
5. Involvement of teachers and community in curriculum planning is almost negligible and there is still a deep gulf between schools and society.
6. There appears to be no clear-cut statement of objectives of educational programmes at different levels and as a result, there is duplication, ambiguity and vagueness in the courses prescribed at the primary and secondary stages.
7. The traditional method of preparing very brief syllabus outlines still continues to exist. Such outlines fail to offer any detailed guidance to teachers with reference to sources of knowledge, reading materials, teaching aids, films, community resources, etc.
8. Textbooks which are selected and prescribed for schools by the departments are in most cases faulty and defective. Their approval is sometimes based on the reasons other than educational. They lack enough illustrations, exercises and assignments which can help children to have independent study on their own.
9. Very little guidance to teachers emerges from the inspection experience which is not as encouraging and inspiring as it is expected to be. The follow-up of inspection or evaluation report is hardly emphasised for the future improvement in schools.

It is imperative for all the States in India to critically review to their present position and reorganise their functions in the interest of better curriculum administration. In this connection, the recommendations made by Dr. Henry Harap for the appointment of a special Deputy Director of Curriculum in every State is worth considering by the State Departments of Education in India. According to Dr. Henry Harap, (*Improvement of Curriculum in Indian Schools*, Ministry of Education, Government of India 1959, p. 92) the Deputy

Director should be able to lead and coordinate all the activities for the improvement of schools and attend to the following functions:

1. encourage regional and district inspectors to organise programmes of instructional improvement;
2. conduct curriculum conferences for inspectors, headmasters and teachers;
3. encourage training colleges to organise seminars and workshops on leadership in curriculum development;
4. establish experimental centres for school improvement;
5. stimulate headmasters to organise pre-school conferences of teachers for the study of their teaching problems;
6. make such plans for induction of new syllabi as demonstrations, staff meetings, and advisory services; and
7. encourage headmasters to conduct staff meetings which give greater attention to instruction problems.

Thus, curriculum administration is the main spring of educational administration. If it is not streamlined and shaped properly in our country, the whole machinery of education will fail and remain out of gear.

Higher Education and Educational Technology

D. C. Joshi & Sulekha D. Patankar

The university or an institution of higher learning is a place where teachers and students meet to learn the useful knowledge which has been experimented, tested and analysed through current experiences. Irrespective of time and space, higher education propagates eternal truths which are found through reason or faith. Broadly speaking, higher education has three basic functions—knowledge, creation and evaluation. The responsibility of passing the store of human knowledge in the form of ideas and concepts, technology, art and literature in their complex forms, is left to higher education. The creative function of higher education involves extending the frontiers of existing human knowledge through scientific investigations, technological innovations, creation of new art forms and development of literature and literary criticism. Through its evaluative function, higher education provides an important community service. Institutions of higher education are part of the community and yet removed from it. They are ideal places for dispassionate, rational and systematic analysis of scientific, social, economic, political and religious ideas, policies and practices. They are expected to exert powerful influence on the decision-making processes in the community.

The above brief analysis of the tasks of higher education necessitates the reviewing of its role from both the individual and societal perspectives. As a subsystem of the larger system, viz. the society, higher education cannot be considered in isolation; on the other hand, it has to be seen in an all-comprehensive view, as a part of the society. The understanding of higher education functioning as a subsystem of

society is known as the '*Systems Approach to Education*'. System has been defined as a "set of units with relationship among them" and it has a structure and at the same time undergoes a process of continuous change. Systems Approach, therefore, is a scientific understanding of available information, and planning for strategies on the basis of experiences recorded. As the very term reveals, it is a systematic and scientific analysis of any phenomena or process, weighing the processes involved against the objectives. This scientific analysis is objective in nature and flexible enough to accommodate alternatives in order to achieve the goals and at the same time constantly alert to evaluate the functioning of the system.

University—a Systemic View

It has become incumbent on the part of educational planners to view higher education from such a systemic view. The significance of such a new perspective is evident through a number of alternate models developed by eminent educationists like Flanagan, Carrigan and Kaufman, Stufflebeam, John Mill, R. Martin and others.

Though the models may differ in details, they have many common basic tenets or principles. The C.I.P.P. model developed by Stufflebeam and his associates, comes closer to our conception of higher education, as it deals with context, input, process and product in a similar manner as we find it in the Indian higher education scene. The model is presented below:

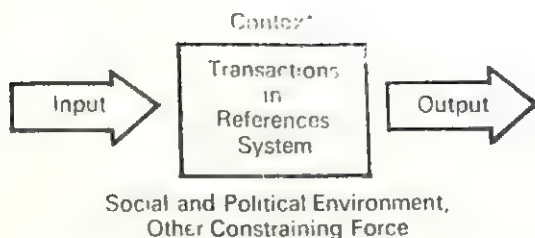


Fig. I

As in the systems view the relevant universe is divided into system and environment (CONTEXT), and both must be analysed; there is context evaluation wherein the environment and its influences are analysed, and process evaluation by which the internal workings of the system are analysed. This model assumes an open system and it provides for analysis of inputs (Controllable elements from the environment which are fed into the system) and the outputs (the condition of certain system components or of the total system after a certain degree of system operation). Inputs can include money, materials, instructional processes, staff, training programmes, or any other such items which are controllable or manipulable. Outputs or outcomes as they are sometimes called, are most often in terms of the degree to which stated goals or objectives have been met, and in local educational systems these usually concern learner characteristics. There are many outcomes in addition to those related to the stated goals and objectives, and these additional outcomes (Sometime known as 'side effects') have to be taken into consideration to understand the operation of the system fully.

When analysed in detail, the Stufflebeam model reveals the following steps which form the total picture. They are:

1. Identifying the Problem.
2. Perform a system analysis which:
 - (a) describes the system and its environment, current structures, functions and roles;
 - (b) describes target groups and their characteristics;
 - (c) conducts a need-assessment; and
 - (d) identifies constraints, including budgetary limitations.
3. Specify detailed goals and objectives that are intended outcomes.
4. Outline and evaluate alternative courses of action.
5. Perform a system synthesis:
 - (a) Design or redesign the relevant system with specification for:

- (i) inputs, processes, materials, facilities and equipment, personnel;
 - (ii) procedures and transactions within the system; including decision and control mechanism; and
 - (iii) supporting components including information sub-system.
- (b) Construct or modify system components according to the design.
 - (c) Begin operating the system according to the design.
 - (d) Conduct process evaluation.
 - (e) Conduct product evaluation.
 - (f) Assess, revise and recycle through as many steps as necessary.

Viewing it from a systemist's angle, higher education is a sub-system in the larger system (society) which has set its own goals and purposes of higher education. For the realization of these goals the society provides an educational system wherein institutions of higher education function. The society supports this system in terms of finance and absorption of the finished products of higher education. Within this set up, the teachers work out the educational process which consists of:

Identification of needs;
 designing alternatives;
 implementing the designs;
 evaluations; and
 redesigning.

This is a dynamic process of revising and redesigning which, as we have earlier seen, are the basic tenets of *Systems Approach*.

Educational Technology

It is in this context that the understanding of the term 'Educational Technology' becomes relevant. Galbraith has defined technology as the 'systematic application of scientific

or other organized knowledge to practical tasks'. The important consequence of this is the division and subdivision of any task into its component parts. The acknowledged role of technology, therefore, has been to improve the efficiency and effectiveness of any system. Hence, in the educational context, the role of technology would mean the following:

- decreasing the time needed to achieve particular objectives;
- augmenting the capacity of individual teachers;
- effecting economics in financial costs; and
- making the process effective with reference to the attainment of educational objectives, i.e. degree of mastery and quality of learning.

Keeping these roles in mind, the National Council for Educational Technology (1967) defined educational technology as the development, application and evaluation of systems, techniques and aids to improve the process of human learning. Application of scientific knowledge about learning, utilization of the products of technology to improve and facilitate efficient learning situations, adopting scientific principles to evolve efficient and objective evaluation procedures, are therefore the resultants of having a systems approach to education. As Dienzeide of *Unesco* stated, all the intellectual and operational efforts made during recent years to regroup and arrange and systematize the application of scientific methods to the organization of new sets of equipment and materials are included in the realm of educational technology. A common fallacy that may be committed in the understanding of educational technology is that it is the application of a new body of knowledge to make the academic process efficient and effective, ignoring the other aspects of the process of education such as the administration, management and financial. In fact, the modern principles of management by objectives which are being adopted in the administration and management of educational institutions are also the outcomes of educational technology. The word *technology*, therefore, goes beyond the usage of the various gadgets which have arrived on the scene of instruction as media. No doubt these means of presentation

(hardware) such as closed circuit television (CCTV), language laboratories, projection equipment and computers are of great significance as far as they make a limited contribution to the improving of effectiveness and efficiency of teaching and training. They are means to the attainment of educational objectives and the knowledge of how to use these hardware appropriately will bring about change in the quality of learning to a significant extent. Whereas the instructional materials in terms of programmes for computers, language laboratories, CCTV, and other gadgets, or self-instructional materials for correspondence and distant education courses, programmed learning materials (plm), computer language, etc. form the *software* of educational technology.

A systematic analysis of the philosophy underlying educational technology reveals that there has been a copernican revolution in terms of the shift on the focus in the educational process. All along, the main emphasis was on teacher and teaching; whereas the modern psychological theories have given sufficient evidence to prove that education becomes meaningful and relevant when it is learner-centred and when the entire system revolves around the central pivot which is the learner. The paradigm given below shows 'how at every stage the learner is the main figure'.

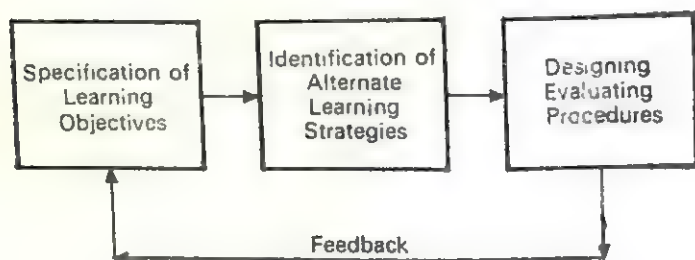


Fig. II

According to the above model, the objectives are to be framed according to the learner's needs; the strategies to make the process successful have to be in terms of learner's abilities and skills, and finally the evaluating procedures will assess

how much or what has been learnt, rather than how much and what has been taught. Needless to say, the learners need would be reflective of the needs of the larger system, i.e. the society's needs, and its economic and material support to the educational system.

Rationale for Educational Technology in Higher Education

The purpose of higher education is to prepare and train the students to be self-motivated learners and become efficient functionaries in the larger systems of society. Till now, the educational environment of higher education had been rather selective wherein the conditions in which the individual learners were expected to learn varied minimally. Even at present, the range of instructional options is narrow and alternatives to succeed are limited. The heterogenic character of the student population is not being taken into consideration when the programmes are being formulated. In fact, a variety of programmes for students of varying abilities, backgrounds and interests are lacking. In such an environment, it becomes necessary to emphasise and foster specific abilities to the exclusion of many other abilities and skills. In this sense, the system becomes selective with respect to individuals who have particular abilities for success, as success is defined, and as it can be attained by means of instruction that are available. The effectiveness of such a selective system will be possible only when such students who have a reasonable probability of success are admitted into it. However, in reality this elitist spirit of exclusiveness has been replaced by making the doors of higher education open and with special facilities for the economically and socially backward. The new trend, therefore, has changed the character of the student population in the university which is composed of youths from every strata of society with equal aspirations but unequal backgrounds and ability. Yet, the structure of the system remains to a great extent the same as the pattern of the selective environment.

Heterogeneity is not the only characteristic of the student population which does not fit into the selective environment. The size of the student population also poses a new problem.

If the help of technology is not resorted to in the instructional setting, even the communication which is basic minimum in the teaching-learning process becomes an impossibility. It does not require an expert to declare that a lecture to 300 students in an undergraduate class would be more effective with the facility of a public address system. The ever growing size of the undergraduate class calls for certain radical changes not only in terms of physical, but also in terms of teaching as well as evaluation.

While on the one hand there is a constant increase in the number of students enrolling in the universities and colleges, there has been a corresponding increase in the quantum of knowledge that has to be transmitted to the students. The boundaries of any discipline that is taught in the university are widening, and to be a *Master* of any one in the real sense is really a formidable task. The only constant factor in this context is 'Time'. In the past it took three years for a youth to get a bachelor's degree in humanities or sciences, and four years to get a professional degree either in engineering or medicine. This has, more or less remained the same. In order to sandwich these modernised courses within the unchanged time duration to a heterogeneous group of students, a scientific analysis of the programmes and a reorganization of the same is necessary.

Moreover, higher education being economically and physically supported by the society, cannot be totally independent of society's claim over it. In fact, the institutions of higher education are becoming increasingly accountable to the society. This factor of accountability necessitates a review of the traditional selective model and systematization of the same to suit its new responsibilities and goals.

With new understanding of educational technology, an adoptive model can be evolved which will enable the system to provide for a wide range and variety of instructional methods and opportunities for success. Accordingly, individual's styles and abilities can be assessed either upon entrance or during the course of learning, and certain educational paths can be selected or assigned.

The implications of utilizing the concept of educational technology in higher education are as follows:

1. Firstly, the goals of the process have to be clarified in very specific and concrete terms.
2. The inputs in terms of students, teachers, curriculum, teaching techniques and evaluation have to be scientifically and objectively selected.
3. The process has to be efficiently and effectively controlled or manipulated with a wide range of alternatives being made available.
4. The outputs have to be evaluated in terms of the targets or goals set.

The educational system will have to have sufficient scope for maintaining a steady feedback, on the basis of which necessary modification, even in terms of goals, could be made. This necessitates a planning and administrative system of a very high order of proficiency, coupled with a vision and at the same time a flexibility which permits reorganisation within permissible parameters. The graphical presentation below would make the point clear.

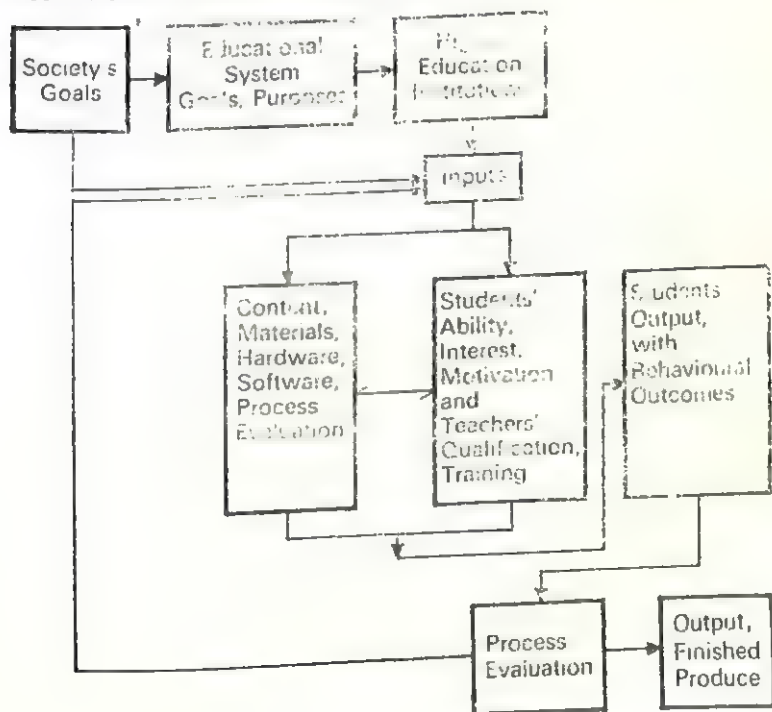


Fig. III

As per the above diagram, the interaction (indicated by the → mark) between the two sets of inputs generates the education process, which in turn, yields the output. A systematization of this process can be further viewed in a systemic view and be called instructional technology. The National Commission of Instructional Technology has defined Instructional Technology to be a 'systematic way of designing, carrying out and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication and employing a combination of human and non-human resources to bring about more effective instruction'. Instructional technology, therefore, is characterized by four features, viz.,

- the definition of objectives to be achieved by the students;
- the application of principles of learning to the analysis and structuring of the content matter to be learned;
- selection and use of appropriate media for presenting material; and
- the use of appropriate methods of assessing students' performance to evaluate the effectiveness of courses and materials.

Educational Technology in Higher Education

The impact of educational technology in the teaching and learning process at the higher education level can be felt in more than one way. Not only has it led to the usage of gadgets and machines to facilitate efficient and effective learning, but it has also helped to understand the learner's psychology and evolve suitable techniques of teaching and evaluation. There has been a revolutionary change in the philosophy of education which Kenneth Richmond describes in his book *Teaching Revolution*. Educational technology, according to him, has another aspect beyond a wholesale extensive usage of audiovisual aids—push button classrooms, language laboratories, CCTV overhead projectors, concept films and programmed learning material. This other aspect takes into account and promises certain fundamental changes both in the subject matter of what is taught as well as in its style of presentation.

An awareness has set in among the teachers that a time has come when mere scholarship on the part of teachers does not ensure the achievement of educational objectives. As a result of this awareness, in many universities steps are being taken in terms of certain pedagogical training inputs for the teachers in higher education so that they may incorporate scientific techniques to make the teaching-learning process productive. This in turn has led to the resorting to an increased use of audiovisual aids like radio, TV, overhead projectors, and other more sophisticated electronic gadgets like computers. These are being used not merely as 'aids' or supplementaries to make the teaching process more meaningful, but as media themselves, implying that the instruction itself is through the medium of above-mentioned gadgets.

As a result, two very contrasting systems have emerged. They are: a very highly individualized system of instruction, and secondly, a factory-like system where mass-learning takes place. Whereas the computer aided instruction (CAI), programmed learning material (PLM), language laboratories where there is a combination of the use of PLM and tape recorders, cater to the first type of system; closed circuit television (CCTV), radio, overhead projectors, correspondence education etc., cater to the latter system. Both systems are products of the contributions of educational technology.

It would be a very biased or incomplete discussion if the impact of educational technology is considered in terms of *hardware* alone. Educational technology gives an insight into the processes that occur in human learning, thereby enabling the teachers to manipulate such activities that are most productive in terms of the achievement of educational objectives taking into consideration the students' characteristics. The teaching techniques that have emerged as a result of this modernization of pedagogy are simulation, games, brain storming, role playing etc. Though seminars, tutorials and group discussions cannot be called modern techniques, their significance as effective techniques have been recognized because of the contributions of social psychology which have scientifically described group dynamics and group processes. Hence, these techniques have a significant role to play in the instructional setting. It has to be understood, however, that

no single method or technique becomes by itself complete or most effective, whereas an intelligent combination of various techniques including the usage of hardware, promise greater and surer results as instructional strategies.

Instruction does not end with the imparting of knowledge by the teacher or just learning of the same by the student; it gets completed when the teacher is able to measure the learning outcome—in other words, evaluation. The modern concepts that have brought changes in the system of evaluation, nay, the very philosophy of evaluation, are the products of the understanding of human learning process. The system of internal assessment and continuous assessment are the resultants of the application of theories of learning which reiterate that the teacher who teaches is the best judge to evaluate the learning taken place, and system of continuous assessment is more effective as it gives constant feedback to the students regarding their performances and directs their efforts to improve. The concepts of Question Bank and Semester System are two other innovations which aim to modernize the system of evaluation. The former makes the phenomena of examination less-searing to the students and assess the amount of learning taken place rather than detect and punish for what has not been learnt. Moreover, these innovations of internal assessment, grading, question bank and semester system have brought about a great amount of objectivity in the process of evaluation and tried to eliminate the subjectivity and inadequacy of the traditional examination pattern at the higher education level.

One of the important goals of higher education is to enable the students to become self-reliant, assume responsibilities and set their own goals. These skills or abilities are essential, because in real life situation there will be no teachers to direct the students as to what decisions to make. In order to prepare them for these situations, competency-based education, which is based mainly on students setting their goals, formulating a course of action and selecting alternatives will go a long way. The software for the competency based education involves a lot of thinking, planning and preparing on the part of the teachers who have to keep in mind the different ability levels of the students. The minute

analysis of the syllabus, organising and constructing self instructional material, programmes for computer aided instruction and PLM material, and in short, the software preparation is the initial and significant phase of systematization of instruction. Once that is done, the awesome burden of teaching content gets substantially reduced and the teachers can devote more time to those objectives which are being shelved on priority basis, e.g. social interaction, value development, civic responsibility, creative thinking, and cultural appreciation. These objectives are being ignored at present due to paucity of time. When the teachers are freed from the tedium of certain activities which may be easily transferred to machines and gadgets, they can pursue activities of higher order forging new ideas and ideals which are necessary to further the course of humanity. In the prophetic words of Glenn Seaborg, "let the teachers make the universities of the world the workshops of human ingenuity and let the tools fashioned therein serve the highest purpose of man" (1969).

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Research and Development in Educational Technology in E.T. Cells in India

S.P. Mullick

Introduction

The term *Educational Technology* began to be used in India during 1960s. The Indian Association for Educational Technology, formerly called the Indian Association for Programmed Learning, had organized the first All India Conference in 1968 on the theme *Towards Educational Technology*. This year may, therefore, be treated as the beginning of educational technology movement in the country.

The decade 1970 may be called the educational technology decade because during this period the research and practice in educational technology began to prosper. The Centre for Educational Technology in the National Council of Educational Research and Training was established in 1973. Soon after, educational technology cells began to be formed in different states and union territories of India. By now such cells have been set up in as much as 18 states and union territories of India. Considerable work has been done in this area and sufficient attention has also been given to define, explain and develop the emerging discipline of educational technology. In spite of the setting up of a large number of organisations and institutions, publication of research reports, books, development of objective-based learning materials and use of new techniques including educational equipment, the term *educational technology* means different things to different people. It seems as if it does not have as yet a conceptual framework. One way to understand what educational technology is to look at *what the educational technologists are doing*.

With this end in view, educational technology cells in the country were approached to collect information about the date of formation of ET Cells, facilities available, research and development work done in ET and their future plans. Responses have been obtained from educational technology cells in Haryana, Gujarat, Meghalaya and Nagaland which were formed in July 1978, December 1975, October 1978 and October 1979 respectively. Information has also been gathered from the State of Tamilnadu and Orissa where ET Cells have been named differently. In Tamilnadu, the States Institute of Educational Technology was set up in August 1975 and in Orissa the Department of Educational Technology in the SCERT, Bhubaneshwar, was set up in February 1974. It is useful to examine the work done in these states during the last few years of their existence.

Particulars of Educational Technology Cells

The particulars of each cell, viz. name, address, personnel employed and physical facilities are given in Annexure-I. It will be noted that there are generally three persons, viz. one Officer Incharge assisted by two programmers/script writers/technical assistants. Only the State Institute of Educational Technology, Madras, has three additional persons, viz., film librarian, film operator and film examiner. The composition of the staff pattern in these cells determines the functions which may be performed by them. It seems that in view of skeleton staff they can help in the development, training and use of radio and/or TV programmes only and can do very little other work in Educational Technology.

If we examine the physical facilities, it seems that all of them have been provided with the audio-visual equipment like films, filmstrips, slides and overhead projectors. Some of them also have public address systems and radio sets. Some of them have cameras, but none of them have facilities like processing of photographic or other reprographic materials except the Department of Educational Technology, Madras.

Work in Educational Technology Cells

All the cells are involved in research, training and development in educational technology in respective states. The

details of work under different headings are as follows :

Research

A list of researches conducted by the ET Cells is given in Table-I.

TABLE 1

<i>S. No.</i>	<i>Research problem</i>	<i>State</i>
1.	Effective utilisation of educational broadcasting in Haryana schools	Haryana
2.	Effectiveness and utilisation of Radio lessons on "Teach English—Learn English Series"	Gujarat
3.	Utilisation of radio in primary schools	Tamilnadu
4.	School broadcast programme in Orissa	Orissa
5.	Radio programmes for inservice teacher training, 1975	Orissa
6.	Evaluation of school broadcast programmes	Orissa
7.	On the spot evaluation of school broadcast programme in Cuttack and Bhubaneswar	Orissa
8.	Impact of ETV in schools	Tamilnadu
9.	Educational television programmes under SITE (I)	Orissa
10.	Educational television programmes during SITE (II)	Orissa
11.	Educational television programmes for inservice teacher training in (1975)	Orissa
12.	Impact of the SITE programme on attendance and enrolment in primary schools	Orissa
13.	Impact of the SITE programmes on language development	Orissa
14.	Survey and study on effectiveness of TV programmes	Meghalaya
15.	Survey of base line data on AV facilities	Orissa
16.	Survey of AV Equipment in schools	Nagaland
17.	On utilisation of graphic materials in language learning of the tribal children	Orissa
18.	Causes of wastage in primary level and search for the solutions for promoting primary education	Meghalaya

Out of eighteen studies, fourteen are on *Mass Media* and four are of other kinds. Out of fourteen studies on mass media, seven studies are on school radio broadcasts and remaining seven are on ETV. Most of the ETV studies pertain

to SITE period (1975). Out of the four studies of miscellaneous nature, three have been done to survey the base line data on audio-visual facilities in respective states. Only one study is an experimental study on the use of graphic materials in language learning on the tribal children, Orissa.

A list of twelve studies which are being conducted and/or will be undertaken shortly is given in Table-II.

TABLE II

<i>S. No.</i>	<i>Research problem</i>	<i>States</i>
1.	Availability and utilisation of AV equipment for instructional purposes in the high schools or District Faridabad	Haryana
2.	Development and assessment of effectiveness of improvised apparatus in the teaching of General Science to Class VIII in higher secondary schools in the district of Gurgaon	Haryana
3.	Preparation of teaching aids in Mathematics for primary classes	Haryana
4.	An experimental study on radio vision programmes	Orissa
5.	Evaluation of educational radio programmes—English classes VIII	Orissa
6.	Evaluation of educational radio programmes—History—Classes X	Orissa
7.	Evaluation of Educational radio programmes—Geography—Classes VII	Orissa
8.	Evaluation of Educational radio programmes—Science Classes VII	Orissa
9.	Evaluative study on ETV programmes	Orissa
10.	Evaluative study on radio programmes	Orissa
11.	Non-formal education—try out of tools in the non-formal centres	Meghalaya
12.	Evaluation of impact of educational broadcasts in schools in Nagaland	Nagaland

Majority of these studies are on *Radio* and *ETV*. Nevertheless, some of them are not merely surveys but are of experimental nature also. The ET Cells are trying to experiment with the educational tools in non-formal educational settings as well.

Training

A list of workshops/Courses/seminars etc. conducted by the ET Cells is given statewise in Annexure-II. It will be noted that all the states except Nagaland are engaged in conducting workshops on development of ETV briefs and scripts. Tamilnadu has been conducting several workshops on other aspects of educational technology like micro-teaching, programmed learning, socially useful productive work materials and improved teaching aids.

The trend in respect of training courses shows that most of the states are engaged in training script writers in radio and TV lessons. Orissa is holding courses for users and resource persons of TV users; in-service teachers in science and their resource persons. The state of Tamilnadu conducts a course on appreciation of fine arts. Haryana and Nagaland are engaged in courses and/or seminars on effective utilisation of educational broadcasting for the benefit of teachers and administrators.

As regards other extension activities, Tamilnadu has organised seminars on educational technology and youth-parliament competitions. Orissa has organised science exhibitions. The states of Gujarat, Orissa, Meghalaya and Nagaland have conducted teacher education programmes through radio-cum-contact programmes supplemented by printed materials.

Development

The materials produced by ET Cells consist of radio and TV programme material, self-learning material, notes and monographs for teachers, and research reports. The state of Tamilnadu has produced a film and several slides/filmstrips. The details of materials numbering fifty-one produced by different states are given in Annexure-III. The break-up of different kinds of materials is given below:

(a) Radio programme material	15
(b) TV programme material	12
(c) Notes, monographs and list of programmes for teachers etc.	13

(d) Programmed lessons	8
(e) Research reports	5
(f) Miscellaneous	2
(i) Film	1
(ii) Filmstrips	75

It will be noted from the above that the development work on educational technology cells is also geared to meet the growing educational opportunities offered by communication technology in the country. The major thrust is on mass media particularly *Radio*, as it exists in every state. The thrust is also on TV wherever the TV facilities are available. The constraints of staff, equipment and supporting infrastructure are the main handicaps in this movement.

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Annexure-I

Particulars of Educational Technology Cells

<i>State</i>	<i>Name</i>	<i>Date established</i>	<i>Personnel</i>	<i>Physical facilities</i>
Haryana	Educational Technology Cell SCERT, Gurgaon.	July 1978	Officer Incharge-1 Programmer cum Script-writers—2	a. Film Library b. Film projector c. Filmstrip projector d. Overhead projector e. Cameras f. Tape recorder
Gujarat	Educational Technology CELL, SIE, Raikhad, Ahmedabad.	24th December 1975	Officer Incharge—1 Script writers—2	Information not available.
Orissa	Department of Educational Technology, SCERT, Bhubaneswar.	28th February 1974	Officer Incharge—1 Programmer cum script-writer—2	a. 16 mm Film Projector b. Filmstrip/slide projector c. Overhead projector d. Record player e. Tape recorder f. Camera g. Microphone set

Tamil Nadu

State Institute of Educational Technology,
Madras.

19th August 1975

Dy. Director
(ET) — I

Asst. Director — I

- a. Film Library
- b. Film projector
- c. Overhead projector
- d. Tape recorder
- e. Cameras
- f. P.A. system

Programme cum
script-writer — I

Film Librarian — I

Film operator — I

Film Examiner — I

Meghalaya

Educational Technology
Cell, SCERT, Shillong.

October 1978

Officer
Incharge — I

Programme cum
script-writer — I

Technical Assistant — I

- a. Film projector
- b. Tape recorders
- c. Radios
- d. P.A. system
- e. Overhead projector
- f. Slide cum filmstrip projector

Nagaland

Educational Technology
Cell, Kohima.

October 1979

Programme
Adviser — I

Programme cum
script-writers — 2

- a. Slide projector
- b. Overhead projector
- c. Camera
- d. Radio
- e. Tape-recorders
- f. Films/slides

Annexure-II

Workshops/Courses/Seminars in Educational Technology

<i>State</i>	<i>Programme</i>
Haryana	(A) Workshop for developing radio scripts on: (i) Geography (ii) General Science (iii) Photography (B) Seminars on effective utilisation of educational broadcasting for: (i) Teachers (ii) Headmasters (iii) Block education officers
Gujarat	(A) Workshop for "teach English—learn English series" (B) Training course for development of (i) TV briefs (ii) TV scripts (iii) Evaluation of TV programmes
Orissa	(A) Workshops on: (i) Radio scripts (ii) TV scripts (B) Training Courses on: (i) Resource persons for TV users (ii) User teacher of TV (iii) Inservice teachers in Science (iv) Resource persons for inservice teachers (v) Teacher monitors in Science (vi) Teacher monitors

- (C) Miscellaneous
Exhibitions on teaching of Science

- Tamilnadu**
- (A) Workshops on:
 - (i) Micro-teaching
 - (ii) Programmed learning
 - (iii) Socially useful productive work materials
 - (iv) Improved teaching aids
 - (B) Training Courses on
 - (i) Radio scripts
 - (ii) TV scripts
 - (iii) Appreciation of fine arts
 - (C) Miscellaneous
Seminar on Educational Technology
- Meghalaya**
- (A) Workshops on production of radio scripts
 - (B) Seminars on Educational Technology for:
 - (i) Teachers
 - (ii) Teacher educators
 - (C) Miscellaneous
Bi-weekly radio programmes for teachers.
- Nagaland**
- (A) Training courses for:
 - (i) Educational administrators in Educational Technology
 - (ii) On effective utilisation of Educational Technology in schools for teachers
 - (B) Miscellaneous
Programmes through radio broadcast and supplementary printed materials for teachers.

Annexure-III

Development work in Educational Technology Cells

<i>State</i>	<i>Materials produced</i>
Haryana	<ol style="list-style-type: none">1. 'Aao Globe Ko Dekhein' for primary class.2. 'Haryana Mein Shiksha Pragati Ki Jhalkiyan' Hindi version for telecasting3. 'Radio Communication' English version4. 'Sanchar Ke Sadhan' Hindi version5. A Radio feature script for class IV and V6. 'A folder on Educational Technology' English version7. A folder on Educational Broadcast Hindi version.8. 'Evaluation report of Educational broadcast in Haryana State' first series 1981-82.9. 'Bharat Ke Rajya Kram Mein Maryada' Hindi version.10. Sports at primary level, Hindi version.11. 'General Knowledge Quiz' Hindi version for class IV and V.12. 'A Primitive Man', Hindi version for class VI.
Gujarat	<ol style="list-style-type: none">13. Teach English—Learn English series14. Radio cum contact programmes on Teach English—Learn English.
Orissa	<ol style="list-style-type: none">15. Upagraha Madhyamare Television Sikshyadana (Oriya)16. Televisionra Upayukta Byabahara Sambadhare Keteka Gyantabya Bisaya (Oriya)17. Television Bigyana Sikshayadana Karyakrama (Oriya)18. Bigyana Karyabali (Oriya)19. Bigyana Karyakrama Sikshyaka Sahayaka Pustake, 1975 (Oriya)

39. Self Instructionals Materials for Primary School Teachers—Scientific Method (Oriya)
40. —The Physical States of Water (Oriya)
41. Teachers' Notes on School Broadcast Programmes on Oriya Literature July-December 1978
42. Teachers' Notes on School Broadcast Programmes on Oriya Literature January-May, 1979
43. Teachers' Notes on School Broadcast Programmes on Oriya Literature July, 1979-May, 1980
44. Teachers' Notes on School Broadcast Programmes on Science in Oriya, October 1978-79, 1980, May 1980.

- Tamilnadu
45. Film on "Educational Assessment"
 46. Educational Filmstrips numbering 75.
 47. Monographs on use of educational aids.

- Meghalaya
48. Low Cost Teaching Aids.
 49. Translation of Primary Teachers' journal into two major languages of the state.

- Nagaland
50. Booklets on educational broadcasts for the whole year.
 51. Survey report on AV equipment in schools of Nagaland.

Open University: An Alternative System of Education

Malla Reddy Mamidi

The need for starting an *Open University* in our country has to be understood against the background of evolving social needs of the country and changing philosophy of modern education. Ever since the nation has committed to the problem of equality in education, "expansion of higher education in the country has been almost phenomenal. The university degree has become a status symbol and desire to pursue higher levels of education has reached all segments of Indian society hitherto untouched by education. But the mere linear expansion and extrapolation of existing structures without adequate corrective reforms and improvements to eliminate certain major defects and inadequacies accompanied by the process of such expansion, would be fatal to the system. As it is not possible to lay any vigorous policy with regard to selective admissions under the present social set up, some propose revolutionary views advocating the need for dismantling the system altogether and creating a new system. In this context, *Open University* through its method of distance education may be considered as a viable approach with pragmatic solutions to many complex problems of ever-expanding higher education in the country.

One of the important ideas about this parallel system of education-to-evolve, is that of *Education-Permanente* or *Life-Long Education*. This is a fundamental break from the traditional concept of education, because it doesn't subscribe to the limited concept of educating a person for a limited period of time; but conceives of it as a continuing process built on the principle of *learning while doing*. This will be a

radical departure from the traditional systems of education in the sense that while the traditional systems of education are oriented towards the building of an *elite and hierarchical society*, the non-formal Open University system ensures an egalitarian social order by providing the learner to learn under a variety of circumstances and conditions on part-time basis using variety of media.

According to Walter Perry, the first Vice-Chancellor of Open University, the concept of Open University in Britain evolved from the congruence of three major post-War educational trends. "The first of these concerns development in the provision for adult education, the second the growth of educational broadcasting and the third the political objective of promoting egalitarianism in education".¹ This system fills the gaps in the traditional approach to adult education, generated by the general aversion of adults to structured reading and examination system, providing them certain unique opportunities for higher education, which are not available in the traditional system.

Professor G. Ram Reddy, Vice-Chancellor of Open University (A.P., India), who visited the Open University (U.K.) on the advise of Ministry of Education, Govt of A.P., observes that "one of the important contributions made by Great Britain to higher education in recent years is the establishment of an Open University".² In his detailed report of the system, he has stated that the university offers education to adults who could not or did not enter higher education after leaving the school and gives people the chance to continue education throughout their lives. Its emphasis is an openness, the meaning of which is providing university level education for all those who are capable of acquiring it, irrespective of their age, stage or previous academic qualifications.³

The Open University of Britain is drastically different from other universities of U.K. Its essential characteristics have been summed up by Jenny Tunstall⁴ in a book as follows:

- (i) The Open University is basically a correspondence university. Students are independent learners working largely in their own homes. They receive teaching

materials and return their work by post.

- (ii) The Open University uses broadcasting and other media. It puts on radio and television programmes which are integrated with written materials and transmitted by the B.B.C. at off peak times; these broadcasts are intended to take up roughly 5 to 6 per cent of the students' study time.
- (iii) The Open University students are adults mostly in the 20s, 30s, or 40s. All the students are part-time students.
- (iv) There are no entrance qualifications.
- (v) The Open University is a nationally spread organisation. The students are spread all over the country.
- (vi) The Open University has an unusual timetable. It operates on a calendar year, beginning in January with final examinations in November.
- (vii) The Open University operates a credit system.

Many of our widening problems of higher education such as quality and quantity, vocationalization, diversification of courses, specialization and compartmentalization of subjects, pursuit of excellence and equalization of educational opportunities will find their answers in the *Open University*. In view of the fact that this system replaces the present expensive *School-dominated, Teacher-Oriented, Fixed-duration* systems of education by a recurrent, flexible, diversified non-formal system of education, it can meet many social demands.

It is gratifying to note that the Government of Andhra Pradesh has come out with its laudable proposal to institutionalize life-long education, by creating an Open University in the state. Establishment of this type of university was long overdue in the context of the learning needs of Indian population. Some of the developing societies in the Asian region like Thailand and Pakistan have already gone ahead with this alternative mode of open learning system of education.

While the Open University in Britain can provide us with a broad framework for establishing a similar university in our country, policies regarding such a new educational enterprise must be formulated, studied, discussed and chosen within our

national context. Any such policy involving radical innovation in education, cannot be imposed on the nation in terms of the pre-designed models from abroad. The entire philosophy of Open University in this country should emanate from the context of our socio-cultural needs and aspirations of the people, if it is to be implemented successfully.

During my experience as the Founder-Director of Correspondence-cum-Contact Programme in Education, Osmania University, I am increasingly convinced that the Open University with Correspondence Courses is the urgent need of the hour. The students within the system, both at undergraduate and post-graduate levels in the faculty of education, were found to be highly motivated, responsible and disciplined whose sole objective, as perceived by the faculty, was to utilise their vacation for the pursuit of further knowledge and improvement of professional qualifications. The nature of feedback provided to the faculty by the students in terms of their active participation in contact programmes, the motivation and commitment with which they pursue their courses, has given a new meaning to teaching profession. While, to be sure, there are certain gaps which are inherent in the system of distance education, one has to view these gaps as necessary evils in the interest of the broader objectives of the system.

For the implementation of the Open University scheme in the State of Andhra Pradesh, it is possible to conceive a fairly sophisticated working model by examining some of the following vital issues connected with the scheme.

- (i) The objectives and scope of the scheme.
- (ii) The nature of the courses and curricular experience to be included in the scheme.
- (iii) The administrative structure and organisational apparatus required for the implementation of the scheme.
- (iv) The establishment of an *Institute of Educational Technology* as part of the Open University to meet the pedagogical needs of the system like the software and hardware requirements.
- (v) Evaluative mechanism to assure self-renewal of the system.

- (vi) Financial resources required for sustenance and continuous growth of the system.

The experience which has already been gained through a number of informal programmes in the country like literacy projects, out-of-school training programmes, and particularly the Correspondence-cum-Contact Programme in Education at the University level, can guide us in working out a suitable Open University model for the country. The expanding communication methods like the television, SITE programme and other mass media, and growing intellectual technology can be effectively involved and utilised for the successful implementation of the programme.

The following factors may be kept in view while framing the curriculum for Open University:

1. Greater attention to rural-oriented vocational courses.
2. Provision for high degree of compensatory education and remedial teaching to culturally deprived.
3. Opportunities for self-study and individualized guidance and instructions.
4. Emphasis on applied researches at higher levels of learning like M. Phil. and Ph. D.
5. Greater flexibility and diversity in curriculum.

To sum up, the immediate need for starting an Open University needs no over-emphasis. It will be unique of its kind in the country and a great contribution of the State Government to the people of Andhra Pradesh indicating their commitment to welfare and progress of the common man. It is the only way through which the nation can satisfy the rising aspirations for education among the people and thereby create an egalitarian social order in the country.

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Evaluating Instructional Effectiveness

S. Shiva Ramu

Instructional methods in the classroom context have been changing radically since World War-II. There had been many experiments, both in the methods of instruction and technology of education throughout the world. In this chapter, a general overview with specific references to India has been presented. In section-I, several models of instruction have been briefly presented. Section-II describes the methods of instruction experimented in U.S. universities and corporations. It also incorporates experiment of preparing Modular Schemes propagated by International Labour Organization. Section-III provides information regarding the design of instruction and the various tools of instructions available, with particular reference to the instructional methods attempted in India. Section-IV provides evaluation of Instructional methods in general and as attempted in India, such as, self-evaluation, Internal Evaluation, Effectiveness of Modular Scheduling and Faculty styles.

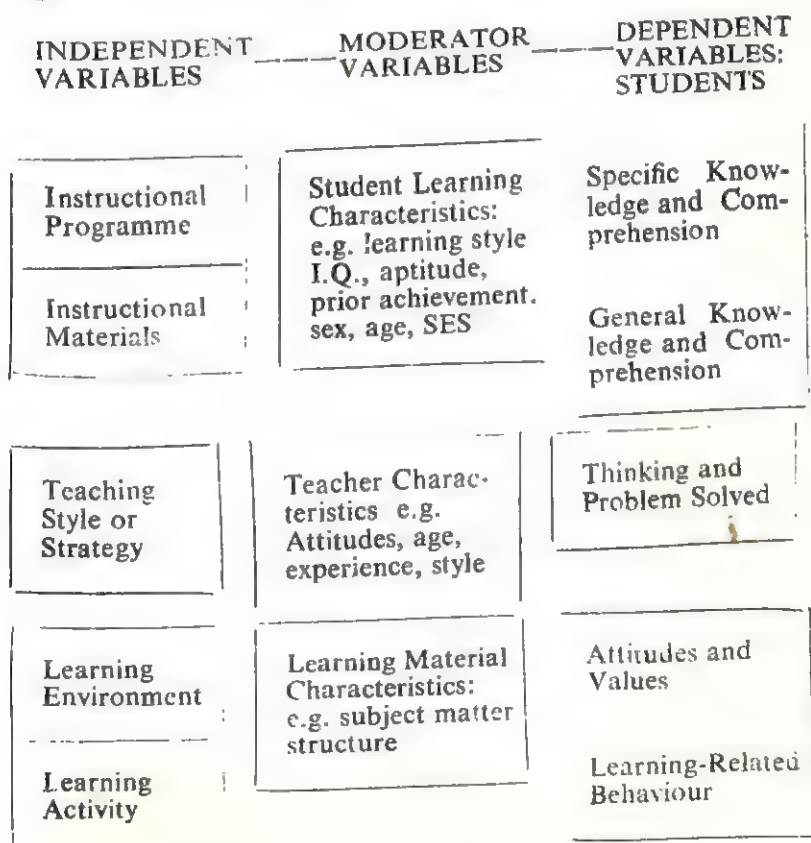
I. MODELS OF INSTRUCTION

A. Variables

There are not many evaluation studies in India regarding higher education in class-room context. The primary unit of the delivery of educational system is the class-room. The educational milieu at classroom indicates the teacher and learner interaction and the learning process that is conducive for self-generating process in learners at a later stage. Many hypotheses can be developed and tested. Here, we are concerned with a general procedure of such methods for testing hypotheses.

Three types of variables can be taken viz., independent, moderator and dependent variables (Tuckman, Bruce, W. 1978). A schematic presentation is given in figure 1. Independent variables are (a) instruction programme such as individually guided education or individually prescribed instruction; (b) instructional materials such as published materials, handouts, multimedia, technological, participatory, manipulable and observable; (c) teaching styles such as student-centre, lecturing, task-oriented; (d) learning environment such as open class-room, cooperative instruction, individualistic

Figure 1: Setting up the variables for Classroom Research



learning environment; (e) learning activity such as learning behaviour, time spent on instruction, homework assignments, etc.

The Moderator Variables are: (a) students characteristics, such as aptitude, ability, achievement, age, personality learning style, etc; (b) teacher characteristics such as background information, attitudes, philosophies and behaviour; (c) learning material characteristics such as contents and structure.

The Dependent Variables are: (a) specific knowledge and comprehension such as achievement test; (b) general knowledge and comprehension such as intelligence, academic ability and scholastic aptitude; (c) thinking and problem solving such as ability to solve problems, searching and thinking rather than use of learned skills; (d) attitudes and values such as attitude towards teacher, value-orientation, satisfaction towards instructional approach, etc.

(i) *Educational Models*. There are several educational models in the science of teaching (Terhart, E. and Drerup, H., 1981). Organizing a teaching process was derived from general theory of learning. This was traditionally accepted practice. Recently the emphasis is changing towards utilization of knowledge. The traditional models are 'the craft model' and the 'theory-to-technology model'. Recent method of model is called as Enlightened Model.

The craft model depends on initiation of systematized practice and skills which were gained by practice. The theory-to-technology model delinked theory from practice. It incorporated other matters such as psychology, social and political bargaining. The modern theory of teaching treated communication in classroom context as 'technological'. Teachers and students are no longer treated as passive adapters. A critical analysis became a necessity and innovation through participative role of teacher and students were given importance. The summary of these various models are given in table 1.

(ii) *Suggestopediy*. Georgi Lozanov has developed certain principles of teaching methods on the basis of psycho-therapy. He attaches 'Non-specific stimuli' such as the teacher's manner of speech, gestures, facial expressions, manner of walking, intonation, 'eye' contact, the setting etc. These components are recorded in sub-consciousness. The suggestions can be

classified into complex and elementary. Complex can be 'prestige' or 'infantilization.' When the information is coming from a prestigious person, the assimilation of information by the pupils will be easy and quick. The infantile relationship of receiving the suggestion is something like a return to childhood in the teaching situation. Elementary needs of suggestions can be 'second-plane stimuli', 'intonation', rhythm and concert like pseudo-passivity. These methods have been tried extensively in the Soviet pedagogy. However, there are some changes in the suggestion of Lozanov's method (A. Lenontyev 1980).

TABLE I

Educational Models: Pros and Cons

	<i>Pros</i>	<i>Cons</i>
1. The Craft Model 'Practice-Practice'	--Theory systematization of practice --Training Procedure hardware-assisted craftsmanship	--No initiation --Existing Practice of teaching
2. The Theory-to Technology	--Separates knowledge of production from fields of utilization --Exercise in deduction --Logical problem of transforming general laws	--Neglects matters of Psychological social and political bargaining 'Technics' and 'Practice' difference abolished
3. The Enlightenment Model	--Not passively adapted --Critical action research --Communication: Democratic	

Suggestivity means "susceptibility to suggestion." Suggestopedy can be either taken as a sole form of teaching method or as a part of teaching process. If it is taken as a sole method of teaching, there are many difficulties such as:

- (a) The determination of role of sub-sensory influences,
- (b) Problem of relation between conscious and unconsciousness in hypnosis,
- (c) Role of dark instinctive-urges in teaching,
- (d) Role of suggestive principles in automatized action,
- (e) Notion of attitude determining personality pattern,
- (f) Problem of intuition as an unconscious channel of communication, and
- (g) Effect of emotion and motivation on the personality.

All the above issues had to be understood before introducing suggestopedy, as the sole teaching method.

Suggestopedy as a pedagogy is based on 3 principles:

- (a) Principle of enjoyment and freedom from stress,
- (b) Principle of unity of the conscious and the unconscious,
- (c) The principle of dual plane suggestive interrelation between teacher and pupil.

In addition to the above principles, 9 subsidiary principles are also involved.

1. Continuity of instruction and the capitalisation,
2. Motivation,
3. Collective responsibility of the class for the attainment of each pupil,
4. Supplementary individual study,
5. Individual homework,
6. Frequent examinations,
7. Aesthetic education,
8. Creative work of the individual,
9. Pupils' activity without any fear of punishment.

Lozanov suggests that the above principles if followed in organizing the teaching, learning is characterized by automaticity, accuracy, and speed.

Morgun while appreciating the significance of the theoretical and empirical findings of suggestology, does not believe in the justification of this method to educational practice and

he believes in the psychological theory of learning as more appropriate instead of suggestopedy (Morgun 1980).

B. A Hierarchical Model

The traditional compliance model and innovative trend of internalization model has been elaborated by Harrison (1972). He emphasises that the weightage should be given to "learning how to learn" rather than learning some skills per se. This would affect the design of classroom processes. Some of the major elements of such a process are influence process, teaching style, design principles, major learning process and level of students' need development. Comparative differences in orientation under compliance and internalization processes are given in table 2.

TABLE 2

A Hierarchical Model of Classroom Processes

<i>Influence Process</i>	<i>Compliance</i>	<i>Internalization</i>
Ideal Teaching Style	Firm and fair, clear and consistent	Competent, trustworthy, judging only, against the students own value and standards
Design Principles	Behaviour and learning specified, assessed frequently, standards of performance clear	Activate students' own goals and values
Major Learning Processes	Rote learning instrumental, learning and reward for correct behaviour	Conceptual learning through discovery and hypothesis testing
Level of Students' Need Development	Subsistence: strong needs for rewards. High degree of dependence	Confidence in ability to satisfy own needs

Source: Roger Harrison (1972). p. 320—1.

(i) *Behaviour Pattern.* The comparative behavioural influences of different models are given in table 3. This indicates

the extent to which students are self-directed and risk-taking in learning process. The traditional compliance model tends to reduce the effectiveness of identification by students with teacher. They will be out of touch with values and attitudes of faculty. Some of the processes such as "technicalization" of the disciplines have tended to reinforce the compliance model. This does not lead to inspiring identification of students with faculty. The internalization model provides some scope for change in behaviour pattern of faculty which would facilitate students' involvement and emphasising on learning 'how to learn'.

TABLE 3

Behaviours Influencing Self-Direction and Risk-Taking by Students

<i>Compliance Oriented</i>	<i>Internalization-Oriented</i>
1. Making all decisions about the course	Place alternatives and choice to students' influence
2. Presenting ideas, facts and opinions as demonstrated truth	Questioning and speculative
3. Presenting only neat, cleaned-up end results of thinking	Presenting the processes of thinking and learning
4. Showing mistrust of students' abilities as self-directed learners	Showing confidence in students' abilities

Source: Ibid.

(ii) *Values and Goals.* Harrison (1972) provides comparative view on issues regarding goals, human relations, teacher's view and student's view. The effect of these in different models are given in table 4. The classroom should provide maximum freedom, encounter and learning 'how to learn'. Rote learning restricts the freedom and increases dependency on external reward system. The latter does not exploit full potential of students. On the other hand, internalization process will be more effective and role of teacher is that of inspirer of learning and a consultant to students' learning activity.

TABLE 4

**Behaviour Affecting Encounter: The Involvement of
Students' Values and Goals**

<i>Issues</i>	<i>Compliance-Oriented</i>	<i>Internalization-Oriented</i>
Values, goals, human relations	(a) "Sanitizing" the subject matter	(a) Open about own attitude and values
Teacher's views	(b) Own values as facts	(b) Owning upto one's own without coercing students to adopt
Students' views	(c) Ignore or reject	(c) relating to course content

Source: Roger Harrison, 1972, p. 334-5

(iii) *Contradictions.* Conflicts of social injustice and the provision of equal cultural opportunities and access of skill has created problem for the educators. The higher education providing more extensive and diversified knowledge has not matched with employment opportunities. The society needs more of ordinary operatives and a few technocratical minds making decisions in advanced society compared with numerous middle level schemes in primitive society.

Curriculum has contradictions of guarding the tradition and adopting modernity in media. Society requires complete change in the teaching structure. The 3 criteria which influence proportion of the content are: need of communication, the development of mind, adapt the students to the contingent requirement of work (Schaeffer, 1980).

Learning experience is a life-long phenomena. This ongoing process requires constant acquaintance of new knowledge and new interpretations. Good learning is based on some premises.

- It should be personalized learning,
- Must be protected from the useless information,

- It should serve to increase rather than to decrease individual differences in the ability of learners to contribute to society,
- Unique minds and talents must be encouraged.

Organizational Learning has to take cognition of:

- Learning is not a mechanical process,
- The continuous flow of events has reduced the options available. Education should lead to participation in decision making,
- Organizational control should be local based,
- Use of media, machines should be in consonance with human values and traditions.

Shane and Tabler are of the view: "In view of human diversity, the good instructional programme should neither turn out programmed pupils, nor seek to create a uniform students product". Education should emphasise:

1. Effective learning experience, should focus on realities,
2. It should emphasise to consider alternative solution to the problems (Shane, H.G. et al., 1980).

II. METHODS OF INSTRUCTION

A Assumptions in Training Programme

Leonard M. Lansky (1972) has expressed the assumptions for changing the classroom as follows:

1. Individual differences affect learning situations
2. Learning is ubiquitous
3. Feelings are real, always present and relevant for learning
4. Learning includes content, skills, attitudes and values
5. Specific learning and results are only probable
6. Human reactions are voluntary and involuntary
7. Man is motivated both to reduce tension and to seek tension
8. Man can examine his own acts, feelings and needs

9. Self-examination is learnable, uncomfortable, and resisted
10. Learning is promoted by feed-back
11. Small groups make more complex and frequent feed-back possible
12. Teachers are models for students
13. One major goal of liberal education is to create self-propelled learners
14. Shared responsibility for teaching and learning creates self-propelled learners in teachers and students.

B. Experiments in U.S. Universities

There were many experiments in classroom interaction of teacher and students in U.S. during the '60's and some of these experiments are given here as illustration:

Meyer. M. Cahn (1972) has used students' model in City College of San Francisco. It was designed as follows:

Discussion of course material by separating the groups into students, observers, intermittent participants and instructors. Panel discussion on different topics of observers were ignored and wherever observer wanted to participate, they were allowed as intermittent participants. The basic elements involved were performance, exposure, judgement and activity. The role of a teacher was that of an organizer and manager.

Evaluation: Students were motivated and were involved in the process of learning.

Robert E. Horn (1972) has experimented in Programme Learning at Columbia University. Environment provided 20 learning stations and allowed students to self-directed study. Each learning station had materials like articles, pictures, audio material, etc. Each learner had control over his selection of goals and they were in charge of learning process. Sequence step would be decided by student himself. The role of a teacher was that of a consultant who devoted sufficient time for each individual as and when they require and he is not an information transmitter.

Philip J. Runkel (1972) used Campus as a Laboratory at University of Oregon. Learning course process is changing

one's adaptation to the changing patterns in the environment—making a bridge to the world beyond the class-room and investigating external factors themselves, work group plan and collective data and immediate feedback to the students about his progress and quality of the work. Work groups were intended to help to learn effectively. Learning situation had high degree of free choice about cognitive content and scheduling.

C. Experiments in U.S. Corporations

Experiments in learning process were not restricted to universities in U.S. Some of the companies with or without collaboration of universities have experimented in teaching methods. As an illustration, two such companies are given below:

(i) *Bell System*: Ron Anderson (1981) explains the changing philosophy and methodology at Bell System which has 3 separate operations: Research groups (Bell Labs), the Manufacturing units (Western Electric), and Interstate network (Long lines) and the 22 autonomous operating companies. For the requirement of training between these operations, Bell System has developed a standardized training programme. In 1950s Bell relied mostly on technology to solve its problems. As such, it emphasized craft training i.e. on the job variety, conducted by skilled technicians. Besides, there was some classroom training. Even the management training reflected the same philosophy as applied to craft. Most of the management courses were condensed and provided in the form of craft training.

In 1960s similar patterns continued except an introduction of "self-paced training" courses and Bell developed a standard programme instruction format and this was assisted by AT and T. The slight shift in the curriculum was made from the heavy dependence on technical subject to managerial skills and objective evaluation techniques were also expanded.

In 1970s there was a radical change in Bell training system. It emphasised mostly training efficiency and effectiveness. The concepts and techniques such as problem analysis, performance analysis, task analysis, training design and evaluation

were part of the training courses. There was also a centralization in the system i.e. course developed by one company was shared by other units. There was an attempt to train professional in-house personnel in problem and worth analysis skills.

The tendency towards efficiency brought the changes in the training programmes, such as:

- (a) Course development activity has become more fractionalized i.e. highly specialized skills for specific areas of training process.
- (b) Communication design and the production aspects of training are given more importance.

Bell System emphasizes most of the courses from the point of view of cost worth analysis and performance analysis. This would save lot of time and money for industries to retrain them.

(ii) *United Airlines*: D. Jeffrey Cain (1981) explains the training methodology adopted at United Airlines for its flight training management which has designed a training programme based on the computer. This is called Criterion Referenced Instruction (CRI). The corner stone of this approach is evaluation. The mastery over a subject matter is indicated by the test. But the package also takes into account content, behavioural objectives and training packages. First, it defines the contents and provides necessary revision and approvals in logical sequences. It provides the best type of test suited to subject matter. This is individualized. The individualized and group records are given a scores test. Accordingly it prescribes subjects, study materials, computes learning resources effectiveness and maintains a question by question item analysis. The first such computer based training programme at United Airlines was introduced in January 1978. The company realized that there is lot of saving due to use of this programme package. It is using this instructional method in its training programmes for DC 10 flight guidance system, Boeing 767 programmes, etc.

The students can either review the learning resource first and then take associating module test or alternatively he can

take the test first. If the test is mastered, then learning resources need not be taken. Otherwise, computer prescribes the appropriate learning resources which must be taken before re-testing.

D. Experiments by International Labour Organization

ILO is an organisation which has tried to provide modules for training in different countries taking into account variations and similarities of skill transfer (J Prokopenko and Lester R. Bittle 1981).

ILO has prepared 35 basic training specialized courses in a modular format specifically for training supervisory staff. This was done after an extensive research in identifying universal problems and also segmenting the supervisory training needs. Each module consists of 5 parts:

1. Overall learning objectives and table of contents,
2. Basic overview of subject or function,
3. Methods and techniques,
4. Action exercises and case study.
5. Summary.

In each part of the module a provision is made for setting of learning objectives and a variety of self-administered progress review questions. The module design has the following methods:

<i>Training Method</i>	<i>Percentage of time</i>
Lecturing	10-20
Films, group discussions, role-playing	35-45
Case Studies, projects, problems	25-35
Homework, self-development	10-20
Performance (Course evaluation)	5

Modules provide only some guidance, but freedom is given to local training specialist to adjust balance of time distribution.

III. DESIGN AND TOOLS OF INSTRUCTION

A. Designing Training Programme

(i) *General steps*: Stan Carnarius (1981) suggests the general steps in designing a training programme which are as follows:

- Concepts
- Possible activities
- Objectives
- Methods considered (check Vs objectives)
- Sequences
- Test Agenda
- Materials

At each stage they are looped back to check against the previous steps. In the concepts stage it is necessary to find out development needs, performance deficiencies, organizational constraints and training contents. There are several standard activities such as, lectures, briefing, instruments, simulations, cases, role-playing, modelling, practice, feed-back, etc.

The third stage in the method is to find out the appropriate objectives of the programme.

The next stage is to consider training methods. Training methods can be questions, instruments, presentation, discussions, workshops and cases. One can have a test agenda. Once that is done, the next item is to identify the training materials.

(ii) *Prioritization of Information*: Pinkstaff (1981) suggests that it is necessary to prioritize the information required for a programme like:

- Must know
- Should know, and
- Nice to know.

The first category is the critical points and other category is the less critical, may be extra interesting additions. The first subject matter is selected, and the necessary information

and goals and objectives of the programme are determined. Programme designing consists of 6 steps:

1. *Introduction*: Explaining the objectives and the sequence of the programme.
2. *Pre-view test/grid*: This, is used to find a base-line to determine participants' existing knowledge and their level of sophistication or it can indicate the appropriateness of a programme.
3. *Article*: This can take some different forms such as articles, films or article with supporting film or the reverse, etc. This would provide an opportunity for creative thinking to looking at known-facts in a new light.
4. *Exercises*: To keep group involvement and interest high in the programme, many kinds of exercises can be administered:

- True or false statement
- Fill in the blanks
- Multiple choice
- Case Study
- Group discussion, role-playing (Structured or unstructured)
- Work problems
- Strategy development

For different levels, different methods can be used.

5. *Review*: Review is an additional exercise which will reinforce the programme content upto a point and also provide feed-back for the instructor.
6. *Summary*: Where the instructor has the last chance to communicate the information regarding what one must know, and also provides some indications regarding other aspects.

(iii) *Performance-Oriented*: Stein, David S. (1981), suggests that designing should have performance-oriented training programme. To determine the cost effectiveness of education

and training programme he suggested and modified "critical incidence technique" as a diagnostic tool. This will provide the learning needs as perceived by the learners, and it will identify successful or unsuccessful behaviour patterns. The essential characteristics of a prescriptive learning need are:

- necessity for a desired state of affairs
- must be lacking, absent or deficient
- as a legitimate claim attitude with something ought to be done
- capable of being satisfied by means of an appropriate learning experience
- cost effective diagnostic tools should be problem centered, based on the principles of adult learning performance measures.

The critical incidence technique obtains its data from first-hand experiential report from actual employees and it consists of 4 phases such as:

- Climate setting
- Data collection and analysis
- Interpretation
- Programme development

B. Tools of Instruction

The educational technology has to be integrated into the educational system. The existing system of education may not serve the purpose. The quality criterion is the major measure used for the effectiveness of educational technology. "Mathematics is a science dealing with the . . . behaviour of pupils while learning. The educational technology provides methods for smooth transition from teaching to learning." On the basis of mathematics rather than pedagogic teaching alone, an appropriate technology should be selected (Shivanarayanan, 1980).

There are many tools available for restructuring education in a classroom context. It can vary from chalk board to television and computer. Edger Dale has classified instructional aids into 12 categories in order of effectiveness and the

growth of the learner (Balasubramaniam, 1981). The 12 categories are as follows:

12. Verbal symbols
11. Visual symbols
10. Radio and recording
9. Still pictures
8. Motion pictures
7. Educational television
6. Exhibits
5. Study trips
4. Demonstration
3. Dramatized experience, plays, puppets, role playing
2. Contrived experience-models, mock-ups, simulation
1. Direct purposeful experience.

Depending on the cognitive objective, teacher has to go as slow on the skill as he requires to ensure that even a dull student can acquire it. Selecting any particular instructional aid depends on the learner's characteristics, task requirement, characteristics of material and practical constraints.

The role of teacher accordingly changes from a craftsman to a technician and manager in class-room. When a teacher uses chalk board, he acts as a craftsman; when he uses other categories, he will be a technician and in case of self-presenting aids, he will act as manager. The emphasis is also on communicating information and coordinating all the 4 senses such as, sight, hearing, touching and aesthetic. On the basis of these aids, it is assumed that the teaching aids have passed through 3 generations such as, from craftsman to technician and to present-day manager.

There are some attempts to provide in the appropriate mix of systems for effective teaching (Verghis Chandy, 1980). One such suggested method is an integrated approach to audio-tutorial systems. This is based on 4 suggestions.

1. *Independent Study*: This enables the students to have a lot of freedom and with the help of an instructor can use the facilities and also programmed instructions.

2. *The General Assembly Stations*: This provides the activities for a large group, seeing films, listening guest lecture, etc.

3. *Integrated Quiz Session*: One really learns a subject when one is allowed to teach it so that every student is provided an opportunity to give a brief lecture.

4. *Projects*: They are also expected to complete a project where there is auto-learning.

A programmed instruction can be an effective instructional technology for the country. The advantages assumed are that the kinds of machines used in programmed instruction will help in teaching-learning process. It does not eliminate teacher's role of providing further cognitive information besides programmed learning. The role of teacher will change from mere transmitter of information to teaching-learning process (Ravishankar, 1981).

C. Indian Context

(i) *Value System—Higher Education*: S K Ookerjee (1980) says that all higher education in India is purposeless. The environment of the students, family background, circle of friends, etc. are anti-intellectual and anti-academic. Education is assumed to be theoretical, unpractical and remote from real life ('it is considered to be boring'). The teachers also have become cynical about the ideals of education because of the decision making bodies of the university being diverse from the class-room reality. As such, the university examination has become the kingpin. This in turn has affected the expectations arising out of the courses in higher education and it tends towards an emphasis on memory work. This is different from the concept of learning. There is no flexibility of hopes. There was some attempt by UGC at one time to create question banks which in turn feared the growth of answer banks or coaching classes. This has led UGC to abandon its idea of model questions. Learning has become synonymous with memorising; as such regular attendance test, homework and internal assessment have all become futile.

Agreeing with the conclusions, Suma Chitnis (1980) differentiates the growth of higher education in India and its evaluation before independence and after independence. The majority of university systems have been super-imposed with the present values and with the colonial system have resulted in the decay of higher education, and reduced the academic

role into mere lectures with a limited task of "grooming students for examination." However, in India, attempt is also made to establish national laboratories and other institutions of higher level. There is more difference between university system and other specialized institutions where there is a flexibility in their operation. The methods of instruction and evaluation in university system continue to be those of colonial heritage, while in the other institutions flexibility has been given.

Norman C Dahl (1981), has analyzed that specialized institutions established by Government have resulted in effective efforts and collaboration between university, industry and Government. There has not been much effort in bringing the collaboration towards a purposeful action. These specialized institutions were established to create a scientific base of indigenously created sources of material for further learning and having a continuous interaction with the industry and Government. It is claimed that "IITs have succeeded too well in their undergraduate training and have become export factories which send the cream of India's technical talents abroad." Most of these specialized institutions have not achieved the desired goal of tackling current problems of the country.

(ii) *Semester System*: The traditional educational system relying on teaching for 8 to 10 months has an examination at the end of the period. The defects are:

1. This system does not concern itself with whether the pupils have understood the concepts or not. The evaluation is based on memory rather than understanding concepts.
2. Rewarding system is only final examination. As such, there is inadequate reward for the regular class work such as, home assignment, seminars and individual projects. There is unnecessary emphasis on the terminal examination.

Due to the above defects, the semester system has been suggested. This has been most successfully experimented in the USA during the 1950s. This system assumes many factors

such as, performance of teacher, motivation of students, proper organizational efforts, etc. It also has internal assessment system where the teacher is responsible for the evaluation of the course, and this is a continuous process and grading is done in alphabets instead of marks. The success of the semester system depends on the following factors:

1. It is assumed that teachers are capable of designing various learning activities suited to individual students.
2. There is a low teacher—student ratio.
3. There are facilities for students to experiment their assignments.
4. There is academic environment such as, good library facilities and regular contacts between students and teachers.
5. There is full autonomy for faculty and institutions to tackle their own systems (Srinivasa Murthy, 1979).

According to one experiment in Madras University, it appears that semester pattern has not been successful because students have not been really motivated and the teachers have not planned their courses properly. They try to cover the complete portion in the texts in a short time at the end of the semester. The assignments given to the students can not be completed due to lack of facilities. It appears that both students and teachers are dissatisfied with the semester system (Rajeswari, 1981).

(iii) *Methods of teaching* (a) *Dictation*: Dictation of notes to students is a common practice in the class-room scene in India. Dictation becomes necessary in situations where textbooks are referred to and lectures are not easily accessible to students. Sometimes to provide the latest information from the periodicals, dictation is also used. Variant of this dictation is providing lecture notes or hand-outs, either duplicated or xeroxed copies, which are used in Western counterparts. In Indian context, due to lack of facilities and finance, the method of dictation is resorted to in a classroom. This method is used as a practice in the Indian context to manage the large classes and to control the students. This has become

an effective method due to the existing examination system—the essay-oriented examination and information-oriented test. This method satisfies both students and teachers equally (Visweswariah, 1978).

(b) *Project Method*: One of the pragmatic schools of philosophy in educational method has suggested that project method is appropriate instead of restricting to the setting up of a fixed curriculum. This method offers freedom to the students in the selection of a problem and approach to choices of solving the problem. It can be undertaken either individually or integrated with a group work. This method involves elements of motor skill, reflective thinking, transition and difficulty analysis. The teacher's role will be that of a prompter and of directing the project instead of dictating the method of assignment (Natarajan, 1978).

(c) *Discussion Method*: There are many methods adopted in the discussion approach. This can be either initiated by the teacher by introducing the topic and providing general guidelines or with the consent of the students the topic and the method are cooperatively selected. There are several types of discussions methods such as, group discussion, panel discussion, round table discussion, open forums and symposium. The type of discussion method chosen depends on the nature of the topic. The role of a teacher is to stimulate students' mental activity and inform on the sources of information. However, it is felt that in Indian context the students are not prepared to participate in group discussions and also are not in a position to challenge the authorities.

The group discussions can also be structured or unstructured. In the unstructured group, discussions may be dominated by vociferous members but when it is structured it will have a theme analysis, allocation of time and integration of different materials for a given situation are planned in advance. There are methods to find out whether the discussion method is successful or not in the learning process. One such method is that of Fawcett Hill's group cognitive map which evaluates the individual perspective and contribution and also group performance (Swamy, 1978).

(d) *Team Teacher*: This is an innovative approach of team teacher in the instructional method. This involves purely

kinds of talents available for a programme. The team members may be from different specialities and they will instruct in their areas of speciality. There are two types of teaching teams. One is teacher unit specialized approach. This allows an expert in certain aspects to tackle the subject in their class. The second approach is the differentiated role specialized team, where specialists introduce techniques rather than subject matter. Some have doubts about the team approach compared to conventional methods of teaching. The fear is that smart teachers may like to monopolies. However, the success of this approach depends on the teams themselves. This method is being tried in some IIMs.

IV. EVALUATION OF INSTRUCTION

A. General Methodology

It is becoming more important now-a-days to determine the cost and benefits of a training system. Kearsley and Compton (1981) suggest the following method for cost-benefit analysis of training programmes:

Training resource requirements can be identified in 4 categories: personnel, equipment, facilities and materials. The cost of a training system and life cycle of months or years can be determined on the basis of total start up cost + steady state cost + total transition cost.

The benefit models deal mostly with training efficiency instead of effectiveness. The methodology for developing a benefit model is to show causal relationship between training system and benefits. The parameters for training systems include students' capacity, availability of instruction, presentation capability, interactive capabilities, testing capabilities, management capabilities and so on.

The benefits are effected by the parameters such as, students' completion time, retention, motivation and attitude changes, level of mastery, development and revision time and attrition/failure rate. Finally, operational benefits of a training programme will include increased job proficiency, higher production, reduced equipment failure, improved safety records, reduced customer complaints or service calls or

increased sales. The sensitivity analysis can be done on different training programmes.

Productivity analysis combines the training effectiveness and efficiency. The productivity in training is a function of skills of the trainer, training procedure, design and development of the training, delivery system, etc. From the students point of view, the productivity is a function of learner's profile such as aptitude, motivation, age, nature of presentation and amount of practice.

B. Experience in Evaluation in India

(i) *Self Evaluation*: The effectiveness of instruction in classroom context depends on the teacher and teaching-learning process. There are several methods developed for teachers' self-evaluation which will provide feed back on the quality of teaching process in classroom. Many evaluation systems developed have the following assumptions:

- (a) Teaching is a process of interaction between teacher and learner.
- (b) Teaching can be analyzed as a behaviour in a social context.
- (c) Teaching can be analysed as a series of views.

Most of the systems, either individually or in aggregate, focus on the following issues:

- Affective,
- Cognitive procedure,
- Physical environment,
- Psychomotor activity, and
- Sociological structure.

Teachers can select any technique depending on the emphasis given to the above issues (Padmini, 1978).

(ii) *Internal Evaluation*: Many institutes and universities have introduced internal evaluation system in India. This system aims at the following:

1. that students are supposed to assimilate information

- systematically, intensively throughout the year;
2. the student will have scope to compare his work with others;
 3. teacher will have an idea about his coverage of various topics and to provide personal guidance to students; and
 4. teacher can compare the effectiveness of different teaching methods.

Some of the methods for internal evaluation are: short quizzes, getting feedback on questions at the end of each assessment, assignment on specific topics, test at frequent intervals etc. There are several problems in internal evaluation. From the student's angle, the problems are:

- Indifferent attitude,
- Aversion to internal evaluation system,
- Lack of clarity and guidance from the staff,
- Lack of feedback on his assignment,
- Suspicion about partiality.

From the teacher's point of view, the difficulties are:

- Lack of text-books,
- Non-availability of teaching aids,
- Frequent changes of subjects,
- Insufficient time to correct the assignments,
- Indifference and aversion to internal evaluation,
- Pressures of students, etc.

Some of the difficulties can be solved by changing the system and also incorporating both internal evaluation and external examination system (Ramalingam, 1978).

One of the ways of evaluating effectiveness of the teaching programme is the questionnaire method with a 5 point scale, where the students are supposed to give feedback on the various titles of the lesson and their amount of learning, whether the learning was learned: some, good, a great deal or thorough. By this way, teacher will get the feedback on the effectiveness of his teaching programme (Sadashiv, 1978).

Continuous internal assessment can have two parts of the student's performance, viz., physical attendance and mental attention. One of the schemes suggested is that 20 percent of the marks should be allotted for the physical attendance and behaviour of the students in the classroom and 80 percent should be allotted for mental attention in class-room. There are various types of tests to measure the academic performance, such as, written test assignments, seminars, quiz, etc. (Dharmapadham, 1980).

Most of the present systems of evaluation of teaching-learning process are based on question-answer method. The questions may serve several purposes and appropriateness of questions depends on the performance of the exercise and characteristics of students. Characteristics of good questions are that they should be:

Clear, purposeful, brief, natural and adopted to the level of the class and thought provoking (Prahallada, 1980).

There are many attempts in reforming the education system through the improvement of syllabus, teaching methods, seminars or tutorial systems. However, the evaluation system has remained unaltered. It is felt therefore, that the reform in the evaluation system will improve the areas of teaching, such as syllabus, teaching methods, contents of text and other teaching aids.

The reform in the setting of the question paper is significant and the objective of question paper setting should be to test the faculty of students in respect of memory, thinking and application. Accordingly, question paper should be divided to evaluate each one of these faculties (Oza, 1980).

(iii) *Teacher's evaluation:* There are other appraisal systems to evaluate university teacher's performance and some of the Indian Universities are trying to introduce teacher's performance evaluation. One such method is the feedback from the students to measure the teacher's performance. Another index is also developed depending on the research output and publication. The teacher's effectiveness measure may include:

- (a) Feedback from students;
- (b) Research output, publications and papers submitted to conferences and seminars.

Composite index of all the items would provide an index of the teacher's performance (Sivayya, 1979).

(iv) *Effectiveness of Modular Scheduling*: Gabriel and Pillai (1980-81) have tried an experiment to find out the effectiveness of modular scheduling in Biology. Three criteria were used, viz., learning efficiency, learning time and relative rate of retention. The learning efficiency of modularization compared with control group was 52.9 percent more. The relative gain was 24.3 percent in modular scheduling in terms of concept learning. The retention rate was 27 percent more for modular scheduling. They concluded that alternative approaches will be useful for effective learning. Multi-media technology available in India can be used effectively.

(v) *Faculty Styles*: Srivastava and Singhal (1980-81) have tried to evaluate the effectiveness of different styles and their effectiveness in learning process. The three teacher styles—participative, authoritarian and nurturant task leader are correspondingly synonymous with existing parental control of permissive, authoritarian and authoritative in home environment. They found that there is significant preference of nurturant task leader compared to other styles. This represents that "a teacher represents a father figure, nurturing the students with affection. While at the same time the task is not forgotten for which help and direction are given, at times using disciplinary measures" (p. 136). This may also reflect the college environment. Such researches should be used for selecting effective teachers.

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PART II

Approaches and Methodological Issues.

Selection of the Content

D. R. Portia

Content or subject matter occupies an important place in the curriculum. It provides the means for achieving the goals of education, a means for organising the activities and experiences required by the child to have a gainful understanding of the world in which he lives. The *knowledge* or the *content* is the stock in trade of the school since times immemorial. Knowledge or wisdom comprises various disciplines or subjects. The scope of each subject changes according to the conception of mankind of its purposes. In the early days of pedagogy there was not much knowledge to be imparted and the scope of the content in each subject was very meagre. The areas of knowledge also were very much limited, like sciences, humanities, etc. But the tendency of knowledge is to get accumulated and multiplied leading to many divisions and branches. Thus we have Natural Sciences, Physical Sciences, Humanities, Social Sciences which were further branched into many other fields of learning or disciplines. This growth or multiplication of subjects is taking place in the modern period with much quicker pace than in the earlier days. This feature is affecting the school curriculum with regard to the selection of the content for the purpose of including it in the school curriculum.

Though the present tendency of the curriculum is to lay more emphasis on activities and experiences and give less importance to the theoretical part of the subject, yet the educationists of the present day also are concerned about the uncontrollable predominance of the academic content in the curriculum. Besides this, the varied expectations of the society of the present day education and the need for meeting the changing needs of the society made it essential to utilise the

academic content or the subject matter as a means to attain the varied objectives. This also made it essential to evolve some guidelines or valid criteria for selecting the academic content for the purpose of including it in the school curriculum.

Need For Defining A Valid Criteria For Selecting The Content

Curriculum development is a scientific approach and involves systematic theory for building up a suitable curriculum. It is also a matter of taking various decisions about the objectives, about the content, learning experiences and about the evaluation procedures. It is essential to examine these together with the other factors that make it essential for evolving a criteria for selecting the content.

Explosion of Knowledge

Subject content or what we call knowledge or information is acquired as a result of man's interaction with the universe and naturally it gets accumulated and multiplied, widening the boundaries of every discipline. This is posing a problem to the curriculum planner because he is not able to come out of the grip of the traditional subjects and at the same time make provision for the inclusion of the latest information and making the subject up-to-date. Added to this, there is also the problem of plurality of knowledge. The original fields of learning are branching themselves into new fields with this accumulation of knowledge. The vast amount of research output produced in each branch of learning which is resulting in many specializations is facilitating this splitting. What were once the minute parts of each subject are now being magnified into separate areas and it seems that there is no end to this multiplication of subjects. Since each field is focussing upon a significant aspect of knowledge, one feels tempted to include them in the curriculum which is again a problem for the curriculum specialist. There is all the more a severe problem in the institutions offering general education, whose main purpose is to present a broad basis of education. In order to do so, one has to face the task of selecting suitable content from the varied disciplines and integrate them into units in order to achieve the objectives of general education.

Closely akin to this problem of explosion of knowledge is the problem of previous learning possessed by the modern school going child. The modern child has already acquired a good amount of vast and rugged information because of his exposure to various types of mass media like the radio, the television, the movies, journals, etc. This information has to be controlled and regulated into useful channels. This naturally requires a suitable strategy to predict and control the learning process in a given direction.

Changing Objectives

As the educational objectives multiply we find a corresponding increase in the number of subjects to be included in the curriculum in order to attain them. Today, the school curriculum consists of a number of subjects which were not found in the earlier times. Some of these subjects have practical value and prepare children for some vocation in the society. There are other subjects which are to be learnt for their own sake, like literature, while some are useful for developing proper values of life. While preparing a curriculum, these subjects and disciplines have to be examined in the light of the objectives and proper decisions have to be taken about the choice of the content.

Problems of Obsolescence

Educationists are now-a-days facing the problem of fermentation in education. Knowledge in the modern age is fast multiplying at a quicker pace, and there is a need for constantly examining the developments taking place in each branch of learning and include it in the curriculum. Accumulation of knowledge in each branch of learning is creating obsolescence, and therefore, it is essential to ensure that educational programmes adjust to the cultural and social changes. The subject content that was used at one stage is becoming outdated and irrelevant for another period because of the rapid changes taking place in the world. Thus, explosion of knowledge creates increasing rate of obsolescence in the school learning. The past few decades witnessed a thorough reshaping of the basic concepts and ideas in each field. The pupils who are prepared for certain basic facts and concepts in

the school subjects like science and mathematics, are actually confronted with a new range of facts and concepts when they actually face life. Hence, there is a dire need for constant reconstruction of the curriculum in view of the social and cultural transformations. An understanding of the general principles which have the broader range of application and which are most potential for creating new knowledge will solve the problem to a large extent. The content which is a means to bring out the corresponding behaviour patterns among the pupils also have to be examined and a suitable criteria adopted for the purpose.

Further, modern tendency of preparing a curriculum is to lay more and more emphasis on inclusion of activities and experiences. Terms like '*activity-centred curriculum*' and '*experience-centred curriculum*' are quite familiar to the educationists of the present day. But in practice, we find these approaches are not having any impact on the curriculum. The academic content to which we were accustomed all these years remain very strong and stubborn dominating the entire curriculum. This finally results in making the curriculum purely academic and subject-oriented without any relevance to life in the society. With the increase in the objectives, there is corresponding increase in the new areas of learning. The present day secondary school curriculum which comprises of many new subjects serves as an example for this kind of development. The usual method of meeting this situation is by introducing new units or new subjects. Instead, there should be reassessment of subject matter which facilitates the selection of required content.

We are passing through a period of unprecedented growth in the school going population which consists of pupils with diversified interests, tastes and abilities from different socio-economic backgrounds and education with its aims shifted to the preparation for life, has to cater to these divergencies. Uniform pattern of education no longer suits the present day generation. The academic curriculum, originally designed for a learned minority with its stress on developing intellectual skills and cognitive abilities, has to be readjusted to socio-cultural changes in the present day school going population.

Criteria for Selecting the Content

Smith, Stanley and Shores have suggested the following criteria for the selection of the content:

1. Is the subject matter significant to an organized field of knowledge?
2. Does the subject matter stand the test of survival?
3. Is the subject matter useful?
4. Is the subject matter interesting to the learner?
5. Does the subject matter contribute to the growth and development of a democratic society?

Now, let us examine the above five-fold criteria in detail.

(1) Significance to an organised field of knowledge

The first prerequisite is that the subject content should belong to a branch of learning like the humanities, social sciences, languages, arts science, mathematics, etc. Of course, this principle is being violated because of various reasons like the interdisciplinary approach that is very predominant and the other is that since the emphasis is on explaining the human environment (social, political, cultural etc.), it cuts across many disciplines to explain any aspect of human environment. This is more so in the case of a school curriculum, where the purpose is to explain the universe in all its varied dimensions. But here, the teacher is expected to manipulate and harness the information from various branches of learning in order to achieve a particular goal.

Since the tendency of the knowledge is to get multiplied and accumulated by keeping pace with the man's quest for knowing things in the world today, we find many branches and divisions in each field of learning, leading to many specialisations. This also raises the issue of specialized knowledge and general knowledge. The content in the subject matter should belong to the broad areas of knowledge for the purpose of providing broader basis of understanding of the world. The curriculum specialist should have a clear idea of the nature of each branch of learning and the purpose it serves and the scope of each branch in the curriculum. In the earlier days, the curriculum in the schools of Europe consisted of *Trivium* and *Quadrivium*. *Trivium* consisted of three higher

courses of learning. Theology, Grammar and Logic, and Quadrivium of four courses namely Arithmetic, Music, Geometry and Astronomy. With the inclusion of new subjects and specializations, this order is not followed and many new subjects have found place in the schools of England and other European countries. The modern concept of education and curriculum has also contributed to this change. Since the school curriculum should also deal with the specializations as well as broad areas of knowledge, there should be general curriculum and core curriculum; the general curriculum dealing with general areas of knowledge and core curriculum with specialized knowledge.

The information or the subject matter at school level in each branch should also pave the way for more intensified learning in that area. Therefore, it should provide the fundamental knowledge or the basic information which is essential for gaining proficiency in that area at higher levels. For studying Algebra at higher levels, the fundamental knowledge which is essential at the school level should be identified by the curriculum-maker and included in the school curriculum. Same is the case with literature; to attain the broader values of the study of literature, and to gain a mastery of the subject, it is essential to provide a basic knowledge of the subject in the school curriculum. This may be like poetry, prose, grammar and creative writing of minor nature which should be included and properly arranged according to grades.

Validity is also concerned with fundamentals of knowledge. The structure of knowledge consists of various levels—facts, basic ideas, concepts and modes of thought. Facts are the surface details of knowledge and hence they are not the fundamentals and a knowledge of the facts leads to only mechanical understanding of any event or aspect. It is only the fundamentals like basic ideas and concepts that will really help in manipulating and applying the knowledge received. The tendency of the present day is to concentrate on facts; e.g., the mechanical calculations of algebraic-equations as against understanding the principle, and the learning of dry facts in history without learning the cause and effect relationship of it. The understanding of the basic concepts and ideas will help in applying the knowledge to any new situation.

Hence, the curriculum should consist of a number of carefully selected principles, ideas and concepts which constitute the basic core of a subject matter. The present new mathematics course is based on the teaching of the fundamentals to the pupils and serves as an example of the above.

(2) Does the subject matter stand the test of Survival?

The second principle refers to the relevancy of the subject to the present situation or the status of the knowledge. It also refers to the changing dimensions of the subject. It has been discussed earlier how the problem of explosion of knowledge is coming in the way of preparing a functional curriculum. The common tendency of any subject or discipline is to get multiplied according to the change in the society at large. But there is also the other side of it. With the increase in the man's quest for knowledge, the new discoveries made by man in each branch of learning, the vast amount of research that is taking place in each field of knowledge, the scientific thinking of man and the impact of science and technology that made man to go deeper and deeper into the realm of knowledge, the boundaries of knowledge are getting expanded. In this process, there are many concepts that are becoming outdated giving place to newer concepts that are more relevant to the present society and life of mankind also. The concepts and facts that were very much relevant to the past society and dealt at length in the old curriculum hold no longer good in the present circumstances. History abounds in examples of this type of development. Concepts like open door policy, colonization, benevolent despotism, etc. were widely discussed in the old history curriculum of the secondary schools. But today, the scope of history to be included has completely changed—widening its boundaries.

The modern text-books in history speak about concepts like humanism, secularism, socialism, democracy, nationhood, international understanding, etc. Speaking of *content in history* to be included in secondary school, the ten-year curriculum has stipulated the following condition:

The main focus of this course should be on the study of social systems, in their rise and growth and their replacement

by new forms, and on scientific and cultural developments. The selection of the content should be based on the specific histories of individual countries only where these histories have a significant bearing on the general history of mankind and represents new trends relevant to the history of mankind as a whole.

Same is the case with *Sciences* and *Mathematics*. The latest developments in these fields and their utility to the mankind should be the main criteria for selecting the content.

The status of knowledge also needs to be considered while selecting the content. The information which is tested and tried and which can be applied to the present-day situation only should be selected. According to E.B. Wesley, the principles of generalizations, inventions, and discoveries which are still in the womb of time should not be incorporated into the curriculum. According to Hilda Taba, the knowledge should be valid and significant to the extent that it reflects the contemporary scientific knowledge. The information should also stand the test of survival. Such useful information should be identified and included in the curriculum.

(3) Utility of the subject content:

The content of the curriculum has often become the target of severe criticism by one and all in the society. It is mostly criticised for the heavy load of information which has no relevance to the pupils, for deadwood of information which has no utility, that is full of facts, dry and arid, the learning of which encourages rote memorization or cramming, without leaving any scope for intelligent reasoning. John Dewey, in *Democracy and Education*, severely criticised this type of information or dry knowledge offered in the traditional schools. Knowing the definitions, rules, formulae, etc., is like knowing the names of parts of a machine, without knowing what their function is. According to him, such information is not based upon understanding and interpretation; and because it does not involve application in a variety of new situations, it is readily forgotten. To Dewey, knowledge consists of what we consciously do or make use of in understanding what is happening in straightening out a perplexity, by conceiving a connection between ourselves and the world

in which we live. The knowledge that we use in the schools should have a bearing upon our lives. Otherwise, it is not worth including. This evidently shows the importance of formulating the educational programmes in accordance with the leading activities and needs of life.

The aspect of the utility of knowledge has much significance in higher education also. The aims of higher education, till very recently were only '*discovery of knowledge*' and '*dissemination of knowledge*', meaning research and teaching and whether this knowledge was of any use to the community or not was not given much thought. To these two aims, the third has been added, namely, that of '*public service*'. In the sciences, even today, there is a controversy between *pure research* and *applied research* and shift is towards applied research. All we teach and discover through higher learning should be useful to the society at large. But the curriculum in higher education still insists on information or dry knowledge of facts without considering its utility to the society. This is due to several reasons. There are no specific guidelines to construct the curriculum based on the needs of the society. Higher education, therefore, remained formidable to all the developments that are taking place in the area of education and did not think of any strategies that will assist in bringing to light the various benefits that can be rendered by their branches of learning. This trend is, however, slowly fading away. The aim of public service is receiving emphasis in higher education. There is an increasing involvement of the university teachers in the activities and programmes of society. But this is only one-sided development. While preparing curriculum, the area specialists should make sure of the possible services that can be rendered by his area of specialisation to his community, and then, proceed with the task of selecting the content.

History is one of the strong subjects that is being offered in almost all the colleges and universities in India. But it is being taught only as a long list of facts and events arranged in sequential order and no effort is being made to relate it to the present-day life in the society. History abounds with outstanding examples out of which modern society can learn many lessons. It has got a good amount of potency to solve

the problems of the contemporary society, like national disintegration, racial prejudices, religious fanaticism etc; and even the government can base its administrative policies on the lessons learnt in the pitfalls and successes of the previous regimes and administrative policies. The subject specialist should work in close collaboration with the curriculum specialist and evolve a rational basis that will help him in selecting the content which is of public utility.

In the curriculum today, we find many subjects introduced for their own sake just because they have traditional value. They seem to be so strong and stubborn that no one can displace them though no benefit will come out of them. They find a place in the curriculum simply because they have been there since many years and a curriculum prepared without them seems to be beyond the imagination of the curriculum-makers, who have no weapon or ready-made measures to control their inclusion in the curriculum. The above discussion clearly manifests the need for a framework of rules and regulations to guide selections of the content. Much thinking and research should go into these areas in order to not only identify the needs of society but also to guide the curriculum-specialist in selecting the content.

(4) Interest and ability

One should also consider factors like interest, aptitudes, and abilities of pupils while selecting the content. Unless the content is interesting to the pupils, there will not be any learning at all. Interest depends upon the aptitudes and grasping capacity of the pupils. It is again a matter of age and intelligence of the pupils. The theories of learning and intelligence in educational psychology throw much light on the factors that develop interest among the pupils. Selection of content—suitable to the understanding capacity of the pupils—will result in efficient learning. At the same time, there is also a danger of including the negative side, i.e., including information of lesser importance leaving aside the hard core of it.

While arranging the content, it is essential to consider the basic components of the knowledge. Much depends partly upon how the teacher organizes the subject content and what illustrations he is using in support of the central facts and

ideas that are being included. In the activity centred curriculum, the practice is to select the activities that are of interest to the child and build the rest of the curriculum around them. But this practice went into disrepute for various reasons. There are not many activities around which many subjects can be built. The activities of the children will be very trivial and may not help in training for an insight into real life of practical world. On the other hand, it is advisable to introduce many activities in the curriculum itself to maintain interest among the pupils.

The criterion of learnability is closely associated with interest. The subject content cannot be learnt and assimilated by the pupils, unless it is interesting to the pupils. This factor depends upon the various other factors like age, grasping capacity, time available and nature of the subject-matter. A curriculum specialist should take all these factors into consideration while selecting the subject content.

(5) **Growth and development of a democratic society**

This concept also includes social development and assumes that the social change which is taking place very rapidly should be controlled and directed towards desirable directions. A careful selection of the content that can build *knowledge* and *abilities* is required to deal intelligently with the problems associated with social change. This includes controlling the development of fissiparous tendencies among the pupils and other anti-social behaviour that creates chaos and confusion in the society, and development of social values among pupils. Concepts like '*Democratic citizenship*' is an overwhelming one and covers many other aspects like nationalism, liberty, equality, fraternity and naturally draws its content mostly from social sciences. It is necessary to ensure that science curriculum in the schools help in reducing obscurantism and all sorts of prejudices based on sex, caste, religion, region and language. Besides emphasizing a rational approach, science should also help the development of a democratic, secular and socialist state. The democratic processes and spirit involved in the institutions like the civic bodies and the administrative bodies should find a place in the content of school curriculum.

The democratic concept may not be palatable to the

totalitarian countries. The democratic concept is more suitable in a democracy than in any totalitarian country. Since all the countries are heading towards democracy, this concept in education is given wide popularity and is being practised in many of the schools and colleges of today. This is an overwhelming objective including in itself other objectives like self-sufficiency, leadership qualities and to be a productive member of the democratic society. Of course, there are a few subjects which place one in a better position to attain these objectives by virtue of the nature of the subject-matter. For example, in a school curriculum, subjects like history, civics will directly deal with this aspect; whereas the subject-matter of sciences and languages should be manipulated, harnessed, and arranged for the attainment of this objective.

Other Criteria

The '*objectives of education*' is a major criteria for selecting the content for curriculum. Curriculum itself has been defined as the total effort of the school to bring about the desired outcome of the school education. The desired outcome should be predetermined and they will set the guidelines for the rest of the curriculum activity. Various definitions of curriculum have explained the relationship between the educational objectives and the content. In fact, defining the goals of education is an essential prerequisite of all the strategies of the modern times. The scientific approach, which aims at precision, control and self-correction, essentially requires such precondition. This is the age of intellectual technology which gave rise to concepts like systems analysis, simulation and game theory, decision-making theory, programming etc., and curriculum development also falls in line with them. Since curriculum renewal and reconstruction should be as systematic and scientific—not giving scope for any haphazard decisions—it is expected to spell out in clear and precise terms '*what it is that is going to be achieved*'. In view of the flood of facts and information flowing into the arena of education it is essential for the teacher to take a correct decision about the outcomes of his educational programmes. Thus, predefining the objectives of outcomes will enable the curriculum-maker to arrange the rest of the curriculum programme in such a way that it is

focussed on the attainment of the outcomes defined before hand. This will enable the teacher to select, out of the increasing mass of information, the required subject content and the manifold learning experiences, which are developed and are made available to the teacher. This will also result in reducing the mental and physical strain for the teachers, economy of time and effort and in increasing the efficiency of learning. It will also facilitate in making the curriculum more meaningful and purposeful, providing the teacher with sound and scientific feedback.

Specific objectives and curriculum development

Modern tendency of stating objectives is to express them in terms of pupils' behaviour instead of teachers'. These naturally help in orienting the learning process to the pupils and in systematizing instruction process. It is common to express the curricular aims more specifically in terms of instructional objectives, like knowledge, understanding, application and synthesis. However, there are some misconceptions about the specific objectives—that there is large scope for fragmentation of information and automation of educational process and that there should be scope for certain amount of generality. This type of specification is not very much warranted in curriculum planning. As Kenneth Richmond states, this practice is sound and good as far as short term practice is concerned, but does not make out in higher order of objectives with the same clarity and certainty and does not permit the teacher to find ways and means of achieving them as it is in the case of short term ones. According to him, "fixing higher order objectives and devising criterion tasks for them is easier in mathematical, technical and scientific subjects than it is in humanities." It is expected that the curriculum maker should take a clear stand between too general and broad objectives and too specific and fragmented nature of the objectives while spelling out the objectives.

How a broad goal of Education can be further redefined into attainable ones?

National goals of education provide a strong basis for formulating the goals of education. This again should be

reflected at various levels and structures of education. It is expected that all the courses in the school programme should contribute to the achievement of these general aims. This naturally requires that aims should be expressed grade-wise, course-wise, subject-wise, unit-wise and lesson-wise. If we examine the educational aims in any country, we can see that they are expressed at various levels and grades of education. There are aims of elementary education, secondary education, higher education and again they are stated grade-wise, subject-wise and unit-wise. But all these aims should contribute to the achievement of the general aims of education. If development of democratic citizenship is the aim of general education, that aim should be expressed at various levels of the school programmes, various grades and then subjects. That requires a careful examination of what constitutes democratic citizenship. A democratic citizen should be well informed with sound reasoning and judgement; should think in terms of the welfare of his fellow citizens; contribute to the growth and development of the country; and possess good leadership qualities and understand his position in the society. The attainment of these qualities should be incorporated in the school programme, and they should be expressed content-wise, unit-wise and topic-wise. In a subject like '*Social Studies*', one of the general aims at secondary school will be the development of international understanding. This can be expressed through subject content in the following manner.

To make the pupils understand

- (a) how food-stuffs will have to be shared between lesser and abundant nations;
- (b) how smaller nations need the protection of organizations like the U.N.O. and the Commonwealth;
- (c) about the lives of the people living in different regions; their cultural habits, occupations, social customs, etc..
- (d) to respect the beliefs, faiths and sentiments of others; and
- (e) how the industrial nations depend upon agricultural lands for raw materials

This is the way how a bigger and overall aim can be sub-divided and redefined subject-wise at various levels. This

will guide the curriculum planner to take decisions about the selection of content from larger disciplines. In this world of explosion of knowledge, one is simply baffled at the enormous amount of information growing with accelerated speed; and the common criticism especially at the secondary school level is that pupils are being over-burdened with unnecessary mass of information. Under these circumstances it is only a platform of carefully defined objectives that will show a way to the curriculum specialist in the selection of content and other learning experiences that are relevant to the pupils.

Social significance of the knowledge

Yet another principle that should guide the selection of the content for the curriculum is the significance of the subject content to the social problems. The important characteristic of curriculum development is that it should be relevant to the changes in the society; and it should be focussed upon the needs of the people in the society. The Educational programme of any country should be oriented to the society and its culture which it is serving.

The subject-matter drawn from the various subjects in the curriculum should be focussed upon the social values and the social problems. In order to gain a correct perspective of the society, the impact of science and technology on the lives should also be studied. Technological advances spelled automatic progress and improvement of society, and the pupils should be taught to appreciate these advances. Hilda Taba emphasizes the need for differentiating the material progress from social development. She is of the opinion that technology has introduced an element of confusion in the lives of the people who began to value only technological advances to the neglect of social values. She questions the validity and capacity of modern science to develop moral values and humanitarian outlook among the pupils. For a more functional and society-oriented curriculum, the awakening of social consciousness, the development of democratic values and of a feeling for social justice and national integration are extremely important. The promotion of national consciousness and the development of international understanding should be a simultaneous process. Tolerance,

friendship, cooperation and peace between nations are possible only through a proper appreciation of each country's contribution to the world. National integration can be achieved only through a proper understanding and appreciation of the different sub-cultures of India.

Thus, the curriculum should be conditioned by social setting. It should take into consideration the nature of the governments, the type of the people, their culture and background. The curriculum of democracy differs from that of autocracy. Same is the case with rural and urban areas, industrialized societies and pastoral societies. The social setting should be considered while selecting the curriculum material.

Breadth and coverage

Besides the above criteria, there are many other aspects and principles which will guide the selection of the content. Breadth and depth is one such principle. Breadth of the content refers to the scope of the subject-matter, the inclusion of as much subject content as possible. Depth deals with the deeper understanding of concepts and ideas used. These two are inter-dependent and in order to have a wide understanding of the ideas, there should be enough coverage of the subject.

All the above factors should guide the curriculum specialist in selecting the content from various disciplines, for the purpose of constructing a curriculum.

Structures of Knowledge—Need for Understanding the Structure

The above discussion makes it clear that the curriculum specialist has to go ahead with the task of selecting the content for the curriculum with a great deal of care and restraint, exercising his discretion because of various factors affecting education today. This, further leads us to the tasks of understanding the various aspects of the human learning or knowledge, as it helps a great deal, in not only selecting the valid content and deleting the unwanted information, but also in surmounting certain problems involved in putting the content in its proper place in the curriculum. This,

Understanding of what constitutes knowledge can be achieved by the underlying principle that gives structure to the subject.

The stress on the utilisation of knowledge for the development of various levels of intellectual abilities, and for the application of the information from various disciplines in order to have a deeper view of an event make the study of the structure of the discipline essential. Besides, the present day tendency is towards integration of knowledge or unity of knowledge as against separation. This is more so in a school curriculum whose aim is to provide a broad general base of education and in order to attain this, an integrated approach to subjects is essential. This can be attained by studying the fundamentals of a discipline or what is called '*the structure of a knowledge*'. Every discipline has got its own information and its own way of acquiring that information. As expressed by Philip G. Smith, "an emphasis upon basic structures and principles of a subject would provide the most promising basis for both the integration of learning and the transfer of training. As students gain insight into some of the most fundamental structures that cut across many disciplines, a basis should be established for the refinement of common sense which may be the key to a truly liberating education."

The root meaning of structure is '*to build*' or '*to put together*'. The structure, in other words, refers to the way in which the parts have been put together, the way in which they are interrelated because they are meaningful as parts of a whole rather than as collection of independent items. Structure can also be defined as 'the basic conception and procedures that constitute each discipline and it is this structure that gives uniqueness to any discipline'. A discipline is a way of making knowledge. A discipline may be characterized by the phenomena it purports to deal within its domain, just as chemistry deals with chemical phenomena and literature deals with literary phenomena.

To sum up, modern trend in education is towards integration of subjects as against the separation of the subjects. The knowledge of structure enables the integration process and facilitates the mastery of certain basic facts which produce a much greater orientation towards the world. It is essential for every teacher to understand the structure of the discipline

which will enable him to arrange the subject-matter according to the needs. It is the understanding of the structure of a subject that permits other ideas to be related to it meaningfully. It is the grasp of structure that adds most to the meaning of experience and increases control over the course of subsequent experiences. Thus, the understanding of structure gives control over the unwieldy information which is fast accumulating, and makes the organisation and integration of the subject-matter more meaningful and useful.

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Lecture Method—Its Significance and Implications

A.W. Oak

There are methods and methods of teaching. Teaching is defined in many ways. One of the ways is "Teaching is causing the students to learn." The teaching strategies have been grouped as follows: Communicating through lectures, Utilizing group processes, Facilitating enquiring, and Using self-placed instructional systems (Upasani, 1980). In all these strategies it is the communication that is involved. The interaction in the communication process may be between the teacher and the pupil; pupil and pupil or the pupil and the instructional material. In all types of communication the activity is bi-polar, the pupil being one pole. The other pole may be the teacher or the other pupils in the group or the instructional material say books, tape or films, etc. Now, communication is actually the sharing of experiences. The teacher shares his experiences with his pupils and at the end of the learning process or communication the experiences become the common property of the teacher and the pupil, or the pupil and the communicating agency. Margaret Clark and others in their book "The Learning Encounter" have pointed out—"Communication is an extremely complex form of human behaviour in which the input consists of the speaker and all his motivations, the processing of coding and decoding a message and the output is the understanding of the message by the listener and the behaviour called Feedback that tells the speaker how successful his system is."

The learning process can be activated in a number of ways. The choice of the proper method is determined by a variety of factors (the Encyclopedia of Education, 1971):

1. The type and size of the institution
2. Level of the class
3. Field of knowledge
4. Facilities and financial support—library, aids, etc.
5. Teacher-student ratio
6. Nature of students—cultural background, educational preparation
7. Climate of institution—faculty—student relation, institutional tradition and prestige
8. Teacher's basic concepts of the purpose of education and how it can be best achieved.

Communicating through lectures is one way of doing it. This process of communication is known as the 'Lecture Method.' "The term method is often used to describe instruction in which much of the teacher's behaviour (and often that of his students) is guided by a set of prescriptions or traditions concerning educational techniques and practices"—(The Encyclopedia of Education, Vol. 9). The Encyclopedia of Modern Education has defined the Lecture Method as "Oral exposition by the teacher, usually at some length, of facts, principles or other relationships." The Lecture Method is, therefore, centred round the teacher. It is the teacher who dominates the scene in this process of communication. In olden days "He lectures well" was synonymous with "He teaches well" (Chhatre). In olden days the teacher used to teach the pupils mainly through lectures. In recent times there has been some change, still today the lecture method dominates the processes of communication. The traditional lecture method though under great criticism from many quarters is yet very common and popular and widely used because of its simplicity and applicability in dealing with large classes which are so very common in our colleges.

Thus in spite of some of its drawbacks and limitations, which will be discussed later, the lecture method has to be studied and considered in all its detail so that the maximum possible can be exploited through this means of communication.

What can the lectures be used for and how should they be used in the present discussion.

The main objectives served by a lecture are as follows:

1. To give a general idea of the scope and content of a subject which is to be studied in detail later.
2. To stimulate interest in a subject or line of action or thought.
3. To present a new thesis or technique.
4. To persuade people in their own capacity to understand or enjoy, and
5. To provide an aesthetically stimulating experience.

Merits of the Lecture Method

The lecture method, in spite of adverse criticism, has survived for centuries. It was first originated and practised when the other methods were not even thought of. It is very easy to employ. The main medium for communication is verbal. This method can be employed when the teacher and the taught can understand one common language. The communication is through verbal symbols. When it is a question like teaching Philosophy no other aids are even necessary. The subject itself is abstract and the vehicle of thought, that is the language, is also abstract. Even a simple aid like the chalk-board is also not felt necessary. The knowledge of the 'Vedas' was transferred from generation to generation only through words. The lecturer also thinks it to be a convenient method because he has not to do any preparation, apart from preparing the topic, as is required in some other methods viz., demonstration or use of audio-visual aids. He should only know the subject and have command over the language of instruction. The lecture can straight away go to the class and teach.

The cost of instruction is also reduced by having large classes. One teacher can conveniently handle a class of 100-150 students at a time. He can even have larger classes provided he uses the microphone, so that he becomes easily audible to the listeners. When other methods are employed like discussion or assignment, the cost of instruction goes up because of the limitations of the number of students in a group, resulting in a smaller teacher—student ratio. In case of assignment method the library facilities are to be increased,

resulting in the increase of the cost of instruction.

In a lecture, the lecturer imparts to the learner, by word of mouth, information which he possesses. A lecturer makes a concentrated effort to give to the students academic material which he has laboriously collected over a long period of time, sometimes even years, from a variety of sources viz., the standard books of different recognized authors, the research findings, new trends of thinking. The lecturer analyses the problems and offers solutions and comments made by authorities and his own reactions. Of course, it is to be presumed that the student listens very carefully to the exposition made by the teacher. The student is likely to be benefited by the treatment given to the topic, which he may not find in any book or anywhere else. That is why even the students like the lecture method. They get the information they require.

Robbins Committee of England on Higher Education observed that the lecture method "should bring to students modifications of what they find in their text books, suggest wider reading and when given by lecturers, who are in touch with recent developments, be a source of stimulus and inspiration." A teacher who is in touch with the recent and latest material on the topic is also benefited because he also gets an opportunity to clarify and organise his thoughts when he gives expression to them. It is always the experience of many a teacher that they get a new insight into the subject or topic when he teaches rather than when he simply studies. The lecture offers an opportunity to the teacher for loud thinking, which may clarify his own doubts and can serve as a useful halfway house to publication.

There is also a need on the part of the students to be conversant with new matter or thoughts on a topic, which are not available in the standard text books. There is always a time lag between creation of new knowledge and its publication. This is more true in case of highly specialised subjects and subjects in which new knowledge is created at a faster rate, and therefore, the lecturer can meet the gap of the material which does not exist in print.

Sometimes, it so happens that there is a lack of good books in the language of the student. There are quite a few

students now in our country who take higher education through the mother-tongue. In many languages still the standard books are not available. Hence, these students have to rely on books written in English. A lecturer can supply the information from such books and also will enable the student to comprehend the matter from English books after he carefully listens to the lecture. The primary purpose of a lecture is to present salient facts and concepts in an orderly manner and in a brief time.

The Hale Committee hails lectures as capable of achieving select objectives: to open up a topic; to provide a framework for reading; to provoke concerted and concentrated thinking on concepts and ideas; to bring in related updated information from external sources; to uncover unexplored areas; to change attitudes of learners positively.

A well prepared lecture can create a profound impression on the mind of the students. This point is debatable, but there are instances when the students after hearing a lecture have been motivated to read further on the subject, take action, modify the behaviour. These instances may be few but these things do happen provided the lecture is really inspiring. The inspiration that a teacher can give through a live lecture cannot be received by reading a book. It is undoubtedly true that such kind of inspiration is not given by all the lecturers or even by all the lectures of the same lecturer. When a student watches the teacher who is really interested in the subject, developing it and unfolding the intricate points of a difficult concept, the lecture becomes more effective than simply reading the same material from a book. An effective lecture will motivate the students to read. They will feel the need and appetite for reading. The lecturer should not only expect the students to read but create a climate whereby they will be required to read.

One great advantage of the lecture is that a lecturer can simplify and clarify a complex concept with additional illustrations. In the treatment given in the book there are many times some gaps in the exposition or the logical arguments. All the students are not able to fill in those gaps by themselves. As a result of this, they fail to understand the particular point. It is here that the lecturer can help the

students by bridging the gaps so that the whole argument and the logical treatment becomes intelligible to the students. The lecture is really an excellent method to introduce the basic structure of the subject. The grounding in any subject has to be solid and firm so that the super structure built on it is strong. If the teacher has built up this foundation by explaining the basic concepts, it provides a perspective to the students to understand the subject. It is the experience of all learners that it is very difficult to learn a new subject simply from books or through the other methods like tutorial, discussion, etc. In subjects like sciences, the introductory stages demand the mastery of a large amount of basic concepts. In developing these concepts students by virtue of their ignorance and lack of understanding of the basic concepts, have little to contribute in a discussion.

During the lecture session the pupils are more or less passive listeners. In fact, listening patiently to somebody, when he is speaking is also a necessary quality to be developed in a modern democratic society. The lecture method by its very nature offers an opportunity to develop this quality.

Planning of the Lecture

Every lecture, if it is to be effective, has to be planned. The lecture must achieve one of the following objectives: (1) Acquisition of information, (2) Promotion of thought, and (3) Change in attitudes. The lecturer should set precise objectives so that there is a positive source of motivation which will lead to further learning activity and establish inter-connections of related ideas within the subject or subjects. In order that one or more of the objectives are achieved, a very careful planning is necessary. The lecturer should prepare his lectures either in detail or in points depending on the convenience of the lecturer. The arrangement of points has to be natural, logical and in the proper sequence. The lecturer has to keep in mind the background of his pupils, their age level, language, previous knowledge and the power of comprehension. The attitude of the lecturer, while teaching should be that of a research worker. It will be better if the teacher prepares a brief synopsis of his lecture. This will help the lecturer to keep himself on the track and avoid digressions.

It is better to prepare a selected bibliography and distribute it to the students well before time, so that the pupils will find time to go through the material before the lecture is delivered. If the students can do this, the impact of the lecture will be enhanced, the students will have a better grasp of the lecture and the subject when it is actually delivered.

The lectures can be classified mainly into two types (1) Inspirational, (2) Didactic.

Lectures in subjects like Literature, Philosophy, History, Arts can inspire thought and develop appreciation. Whereas, in subjects like Sciences the form of the lecture is didactic. The main idea in didactic lectures is to give knowledge. But this does not mean that the lecturer has to simply repeat verbatim what is written in books and that too from one standard book. It is ironically said and is also true in the case of some lecturers that their lectures are like heaps of knowledge which passes from the notebook of the lecturer to the notebook of the students, without passing through the heads of either of them. Now this criticism, though sounds harsh, has a ring of reality in case of some lecturers.

A planned lecture has three sections (1) Introduction, (2) Body, and (3) Conclusion. In the introduction stage some reference should be made to the previous knowledge of the students so that when the new knowledge is developed during the body of the lecture it can be linked with the old one. Knowledge does not mean isolated 'pieces' of information stuffed into the head but an organised whole. The lecturer has to show the relationship between the new and old knowledge and the student has to establish the inter-relationship within. Next, the lecturer has to plan to give a clear cut outline of the sequence of points based on the behavioural objectives to be achieved.

The second part that is the body of the lecture may have a number of concepts or ideas or one central idea. The teaching plan can be cyclical. If there are, say, three concepts to be covered in the lecture, the first idea may be stated and developed with the help of illustrations, analogies, some typical applications and some visuals. The second idea is then developed in the same fashion, followed by the restatement of the first and second idea. The third idea may then

be similarly developed followed by the restatement of the first, second and the third idea. If there is only one central idea, the ancillary ideas may be developed with the help of illustrations, applications etc., and connecting them to the central idea each time.

The third part—conclusion—is also very important. In this part it may be planned to give a gist of the whole lecture by stating the main or basic points and paraphrasing the treatment given during the body of the lecture.

Techniques to Increase the Effectiveness of a Lecture

The lecturer to be effective must have clear cut definite objectives in terms of desired changes in the students' mental process and general behaviour. He should therefore, according to the plan, get set for the lecture. In addition to the arrangement and linking of the points in the body of the lecture plan, he has to think of the techniques by which the impact of the lecture will be increased.

The lecturer should not begin immediately as soon as he enters the class. Before beginning, he should take a view of the whole audience and establish a kind of a psychological superiority in favour of the self. Communication is much more than the transmission of messages in the form of words. The process is very complex since the exact ideas behind the words are to reach the learners. It is really an interaction between the two minds. Rapport, therefore, has to be established sending eye signals. He should, then begin, by noting whether he has sufficiently attracted the attention of pupils to him and also if they are in a receptive mood to respond to his lecture. During the lecture he must view the whole class and not a particular section or particular individuals. All the pupils must feel that he is talking to them and not addressing to a few in the class.

The lecturer should take care to see that there is no tension in the class. He should establish a rapport with the audience. The lecture will become ineffective if the lecturer or the students are under some kind of tension. The lecturer will be at ease if he has mastery over the subject and has planned the lecture properly. The tension amongst the pupils can be removed at times by the proper use of humour during the

lectures. This will help to create a cordial atmosphere in the classroom. But care should be taken to see that the pupils are laughing with him and not at him. K.C. Peter writing on "Lecture" (New Frontiers in Education, 1981) has brought out this point very aptly in the following words.

"Remember jokes are of three kinds—jokes that fire; jokes that misfire; jokes that backfire. The first is laughter raising, the sure fire-kind, worthwhile and welcome. The second kind: I may laugh; others won't—disastrous, it is. It would make me look small. The third kind, I know, would be my ruin. It would make learners laugh hilariously. And I would wonder why. For example, the lecturer in Zoology shouting in all seriousness: "Don't talk. This is all about the frog. Look at me please and concentrate." Learners burst into uproarious laughter (and when he knew what it was all about in a flash), he had to sweat it out. Not meant as a joke (in this case) it became a joke and it backfired."

A lecture must be understood by the learners, the points should be registered in the minds of the students, and produce changes in his store of knowledge. The lecturer should make use of the fixing devices like repetition, recapitulation, reviewing, blackboard summary, A.V. aids, home-work and assignment. The words are evaporated if they are not repeated. In case of key points or important statements they should be repeated immediately or at intervals. This can be done while recapitulating or reviewing at the end of the lecture or during a series of lectures. Reading assignments can be given as part of advance student preparation so that a great deal of mental activity can be generated when the lecturer discusses the key questions or points of the topic.

Maps, charts, pictures, films, film-strips, tapes offer a wide range of fixing devices. Lecturing should be properly punctuated with the use of these aids. The use should not be overdone but used in the proper proportion and at the proper place; the devices become a useful friend of the teacher and students. The teacher should develop in him the skill of using these devices and judgement in selectively using them. The most common fixing device is the blackboard. This aid is always available in any classroom. The lecturer must make ample use of the board during the lecture. He should write

down new words, important ideas, draw diagrams to clarify a point. The blackboard is useful for focussing also. The lecturer should focus the attention of the students on intricate and important points. He can do so verbally by using words like—please listen, this is an important point, etc. He can underline or write in coloured chalk when a particular point is to be emphasised.

The lecturer has to build up a picture in the minds of his audience. This he can do by asking rhetorical questions and answering them himself in a manner he would expect the pupils to answer. Some students gain more by hearing but some find listening to words difficult. If the lecture is supported by demonstrations or other visual aids, the mode of presentation changes constantly which helps to attract and hold the attention of students resulting in greater gain on the part of students. Alteration between auditory and visual presentations produce increased attention (Gruber, 1964). The aids help in effective communication. The audio-visual message has a function, a content and a form. All these have a total psychological impact on the learning process. The audio-visual aids help to consolidate the information gained.

The changes in pattern of speech also attract attention. The voice of the lecturer should be sufficiently loud so that it is audible but should not be too loud and shrill to distract attention. Modulation of voice is very important. Listeners do not like to hear the same tone for the whole time. Even the speed of speech has to be changed to sustain attention of the pupils. The speed has to be lowered when the lecturer is making an important point. The question is not how much the lecturer can give but how much the student can assimilate. Pausing is an important technique that should be used by the lecturer. The lecturer must make noticeable pauses after completing an important point or after repetition. He should take a pause when during the lecture he poses a rhetorical question. The pause sets in motion the thinking process of the pupils and gives an opportunity to the pupils to consolidate the point made by the lecturer.

Another skill the teacher must use in the lecture is the stimulus variation. Just as the lecturer has to modulate his voice, he has to make gestures. The gestures should be

meaningful. They should be such that they will add meaning to the abstract words spoken by the teacher. Gestures lend the visual part to the auditory message. We find lecturers standing steady at one place like a statue in front of the class and lecturing for an hour. This happens more in the case of lecturers who practically make no use of the black board and hence do not need to move. The lecturers should make movements which will not distract the attention of students.

The message of the lecture should reach the pupils. The lecture is many times wasted if the salient points are not recorded. The students should be trained to take notes. It offers an opportunity for some activity to the students and lessens the monotony of the lecture. Notes taking helps to fix the ideas. Recapitulation at the end of the lecture, helps the students to give another check to their notes. Taking down notes is an exercise of educational value. It encourages attention. A student should do some follow-up home-work after the lecture is over. He should look up the references given by the lecturer. He should then reorganise and expand his notes to refresh the lecture in his memory.

Criticism of the Lecture Method

Encyclopedia of Modern Education has listed the following objections to the Lecture Method of teaching:

1. Psychologists see learning as an active process. There is little provision made for the pupils' activity in the lecture method.
2. Significance of the student is more than of the subject. In this method the lecturer presents the factual material for students to accept and memorise.
3. There is a possibility that no one except the lecturer is satisfied. Some lecturers are poor and uninspiring.
4. Students, if they do not understand some vital points, lose much of the lecture, since there is no opportunity to discuss and get the clarification.
5. It is a positive disadvantage to those who have not learnt to take down notes.

Some of the other objections against the Lecture Method are:

6. Lectures are ineffective in changing pupil's values.
7. There is too much taxation on memory. The lecturers try to teach too much at a time.
8. It is a waste of time to lecture on material which is factual and available in books.
9. There is no feedback to the lecturer.
10. Lectures keep learners in permanent adolescence. The more the learners develop their capacity to store knowledge the less they develop their critical faculties. The students form a tendency to accept the readymade ideas as they are given to them.
11. In a lecture it is assumed that the educational calibre of all the students is the same. Weak students find it difficult to cope up with the lecture and intelligent ones do not find the lecture sufficiently interesting and inspiring. The lectures do not provide for individual attendance and guidance. It fulfils the needs of average and particularly below average or educationally retarded students.
12. Students are tempted to reproduce the notes given by the lecturer in the examination. This results in cramming rather than understanding the subject.

The demerits listed above are not all genuine. They are not intrinsic in their design. They are a result of defective handling by inexperienced and unimaginative teachers. Most of them can be overcome by properly planning the lectures and making supplementary provisions. There is a growing feeling that the emphasis on lecture ought to be diminished.

Lecturing is an art which can be acquired through proper planning and practice. Lecturing is essentially a one way process but the technique can be modified by introducing some elements from the other methods of teaching. Provision may be made for some discussion at the end of the lecture. The lecturer may keep ten minutes time for clarification of doubts or additional explanation demanded by the students. This will give a feedback to the lecturer and the lecturer can get down to the level of the students. The provision of

discussion time will motivate the student for critical thinking. The lecturer may even encourage the students to ask searching questions immediately when they have a doubt or fail to follow a point, even by interrupting the lecture. Such question-answer sessions will even improve the quality of the lecture as the lecturer will be required to keep himself up-to-date by constant reading in order to face the class with confidence.

The lecturer may give a handout at the end of the lecture giving the summary of the lecture, and the references for further reading. Even the follow-up activities may also be suggested in the hand-out which may motivate the student to read further and think critically. An experiment was conducted by the author, wherein a class was divided into three sub-groups. The first group was asked to listen to the lecture carefully but was prohibited from taking down any notes. The second group was allowed to take down very brief notes. The third group was instructed to take down as detailed notes as possible. The experiment was conducted for ten lectures at the end of which the cyclostyled lecture notes prepared by the lecturer were distributed to all the three groups. A test was administered and it was found that there was no significant difference in the achievement of the three groups. It was thus, concluded that the students need not take down any notes during the lecture if they are provided with notes by the lecturer. The student can concentrate on the lecture and may take down a few points leaving him free to critically follow the lecture.

The practice of dictating notes should be strongly condemned. This practice is followed when the lecturer is not confident of his material and therefore, has a feeling of insecurity within himself.

The idea that a lecturer should cover the entire syllabus through lectures should be given up. It has been found in one investigation as quoted in Bulletin No. 4—The art of Lecturing, published by Macquarie University, Australia, 1968—that 15 per cent students rely almost entirely on the lectures. They study only the lecture notes and do not care to read originally from books. The question is—whether for appearing for examinations is there really a need to do outside reading? Lectures offer information more systematically

and economically. Lectures, therefore, enable the students to make a degree without learning to be self-reliant. The tendency to rely entirely on notes should be discouraged. Some part of the syllabus may, therefore, be left to the students to read for themselves. The teacher may arrange a session for clarification of doubts of the students. This will reduce the danger of spoon-feeding and make the student partly self-reliant.

No single approach to teaching is appropriate in all situations. Effective teaching requires the use of alternative and supplementary strategies. A particular method is never right or wrong in itself. More than one method is essential if all the different objectives are to be achieved. The formal lecture has to be supplemented by other methods with learner-centred activities viz., Discussion, Seminar, Tutorial, Guided reading, Assignment, Brain storming, Buzz sessions and Workshops.

Examination results obtained by using different methods, similar material, for different groups do not show any marked superiority of any one method over the other. Dubin and Taveggia (1968) collected 91 comparative studies that appeared in the literature between 1924 and 1965. The studies bring out this fact. In the two studies conducted by another the same fact was evident. In one study the lecture method was compared to the discussion method and in the other, the lecture method was compared to the assignment method. In both the studies no significant difference was found when the achievement scores in the post-test were compared.

It can, therefore, be concluded that the lecture method has some merits and therefore, it should not be discarded. Lecture method has to be modified and some supplementary methods are to be used to achieve the objectives and goals of Education.

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Concept of Team Teaching

Marlow Ediger

It is difficult to state the exact origin of team teaching in terms of time and space. Joseph Lancaster in the late 1770's, in England, developed a monitorial system of instruction. Thus, a master teacher together with monitors could teach as many as 1,000 pupils in one building with no partitions. Before the school day began, the master teacher would teach monitors who in return taught those learnings to pupils. Approximately ten pupils were seated on each bench with no backrests. Monitors were given considerable authority over the learners being taught. Each monitor would then take his pupils to be taught from a chart on the wall. After instructions, the boys with the monitor returned to their bench to recite what had been learned. The monitor could discipline pupils using methods of humiliation if deemed necessary. A type of teaching team was then emphasised in the Lancastrian monitorial system of instructions. The master teacher taught monitors what was to be taught. Usually, a one-way street of communication was involved; teaching ideas were communicated by the master teacher to the monitors.

Philosophy of Education and Team Teaching

There is a general philosophy of teaching and learning emphasised in the concept of team teaching. First of all, inservice education is inherent in team teaching. When members plan objectives, learning activities, and evaluation procedures for a given set of learners, the team can learn much from each other. As suggestions are being given by members in a planning session, ideas need to be evaluated. Within the framework of evaluation, members acquire new

ideas pertaining to teaching. Too frequently, in a self-contained classroom, a given teacher may rarely discuss ends, means, and appraisal methods with other professionals. In a true team teaching situation, colleagues may learn much from each other.

Secondly, the concept of cooperative planning is relevant to stress in team teaching. Team members need to respect the thinking of each member when cooperatively planning objectives, learning activities, and evaluation procedures. A one way street communication from a team leader to other members on a team will not suffice. The best suggestions for teaching a specific set of pupils ultimately need to be accepted by team members. It takes cooperation and respect to arrive at the best in teaching and learning.

Thirdly, the minds of more than one teacher is considered better (team teaching) as compared to the thinking of one instructor in a self-contained classroom or in a departmentalized room. With harmonizing the thinking of two or more members in a team, pupils might receive higher quality instruction as compared to a single teacher selecting activities and experiences for learners.

Fourthly, democracy as a concept needs emphasis in team teaching. A team leader may be designated to provide direction in planning sessions. The team leader needs to provide democratic leadership, the heart of which would involve respecting the thinking of others. Only then, might the best in objectives, learning activities, and evaluation procedure be provided for pupils. The master teacher cannot learn from other team members if he/she dictates ends, means, and appraisal procedures. With the sharing of ideas in planning sessions, the leaders may well learn very worthwhile instructional procedures from team members. Being a leader of a team in a delicate situation, the team leader must provide leadership and yet be open to the thinking of others.

If a teaching team has no designated leader, then leadership may emerge. Whoever initiates, within the team, suggestions for objectives, learning activities, and evaluation techniques becomes the leader at that moment. As others interact with teaching suggestions in the planning session, leadership continually emerges. Emergent leadership also

emphasises the importance of democracy as a concept to stress in team teaching.

Fifthly, talents of individuals need to be utilised in team teaching. The person possessing the greatest strengths in teaching specific subject-matter at a given time should teach in large group instruction. Thus, a member of the teaching team, the team leader, the principal or supervisor, the student teacher, or a resource person from the community may then present content to pupils. A large group session might involve ninety pupils on the elementary or secondary level.

After large group instruction has been completed, pupils need to divide into smaller groups to classify subject-matter presented in large group instruction. Individual projects and activities also need to be in evidence for responsible learners. Teachers, supervisors, and resource personnel need to guide pupils in committee and individual endeavours.

Routine work such as typing, keeping attendance records and checking out audio-visual equipment, may be performed as tasks by secretaries and aides. Professional education need to prepare for teaching, as well as participate actively in teaching, rather than participating in routine duties and responsibilities.

Sixthly, a variety of learning activities need to be provided to learners. In large groups, adequate concrete materials (objects and items) and semi-concrete materials (films, film-strips, slides, pictures, transparencies and study prints) need emphasising. Ninety pupils in large group instruction need stimulating experiences. Otherwise inattentiveness and discipline problems may be an end result. Learners need to perceive interest and meaning in learning.

Seventhly, team teaching advocates believe that teachers need to plan cooperatively during the school day and not before and after school only. With the utilization of secretaries and aides, teachers on a team may engage in planning objectives, activities, and appraisal procedures at selected intervals on any given school day.

Team teaching, then, emphasises a general philosophy of education involving teaching and learning. This is not to say that team teaching is without its imperfections. Teachers and supervisors need to study each recommendable plan of

grouping pupils for instruction. These plans include the non-graded school, the dual progress plan, heterogeneous grouping, homogeneous grouping, the self-contained classroom, inter-age grouping, and departmentalization. Ultimately, professional faculty members need to select a plan of grouping pupils for instruction, which is justifiable. Each plan has strengths and weaknesses, including team teaching. Ragon and Shepherd¹ list the following pros and cons of team teaching:

Advantages Claimed for Team Teaching

1. Team teaching provides for a better utilization of superior teachers, and more can profit from their teaching. Their influence is reflected in the planning of better programmes of instruction.
2. Teaching teams can utilize any of the horizontal organisations: a self-contained team, a departmentalized team, two teams (one self-contained and one departmentalized) for platooning.
3. Superior teachers receive increases in salary without leaving the classroom to take administrative positions.
4. The plan facilitates the orientation of new teachers to the school system and to the community.
5. Student teachers gain valuable experience by observing the teaching of more than one teacher and by participating in cooperative planning.
6. The use of clerical aides and noncertificated personnel relieves teachers of many non-teaching chores.
7. Pupils gain valuable experience by being able to work in large group learning situations, in small group learning situations, and as individuals.
8. The plan facilitates a more effective use of space, materials, and equipment.
9. The work of the pupils can go on more effectively when one member of the team is absent because of illness than it does when one teacher is responsible for the entire programme.
10. Beginner teachers have a better opportunity for inservice growth than they do when they are isolated in one room.

Limitations Claimed For Team Teaching

1. The success of team teaching depends to a great extent on the ability of members of the team to work together harmoniously. The programme suffers if friction develops in inter-personal relations.
2. Members of the team must spend a great deal of time working on plans for scheduling, for group activities, and for individual projects.
3. The problem of selecting supervisor teachers to serve as group leaders is a complex one; teachers who are very successful at working with a group of pupils may experience frustration when they are faced with the semi-administrative tasks involved in serving as team leaders.
4. Unless the team leader is particularly adept at encouraging new teacher-members to suggest new materials and procedures, pupils may be deprived of experiences that these teachers could provide.
5. Instruction in the large group situations tend to be the formal lecture type pupils have little opportunity to ask questions or make contributions.
6. Superior teachers who serve as team leaders have little contact with pupils; the actual instruction that pupils receive comes primarily from teachers with less experience and competence.
7. Team teaching can operate at its highest level of effectiveness only in a building that has been planned and constructed for this purpose.

Team Teaching and Curriculum Organization

How should the curriculum be organized? The separate subjects curriculum may be stressed. Separate units of study on each of the following may be stressed:

- | | |
|----------------|---------------|
| 1. Handwriting | 5. Botany |
| 2. Spelling | 6. Zoology |
| 3. History | 7. Arithmetic |
| 4. Geography | 8. Geometry |

To relate separate curriculum areas, correlation of subject

matter may be implemented in teaching and learning situations. The following correlations might then occur in curriculum development:

1. *Handwriting and Spelling*: Legible handwriting is stressed in the spelling curriculum,
2. *History and Geography*: As history is being taught to learners, careful note may well be made of when each event took place using mapstands and globes;
3. *Botany and Zoology*: Pupils with teacher guidance study animal life within the framework of diverse kinds/types of plants in the environment;
4. *Arithmetic and Geometry*: Learners with teacher guidance study how to determine perimeters and area (arithmetic) within the framework of squares, rectangles, triangles, and circle (geometric figures).

Further relations in organization might be stressed in the *fused* curriculum. The following are examples:

1. *The language arts*: Reading, listening, speaking and writing are experienced by learners as being related in terms of learnings acquired;
2. *The social studies*: Sociology, anthropology, economics, history, geography, and political science as academic disciplines provide related content in the social studies curriculum;
3. *Mathematics*: The subject matter areas of arithmetic, algebra, geometry, statistics, and probability are included in the broader concept of mathematics; and
4. *Science*: Biology, chemistry, astronomy, zoology, botany, geology, and physics as academic disciplines may provide related content for the *fused* science curriculum.

The *integrated* curriculum attempts to relate more subject matter areas, as compared to *fusion* of subjects academic areas. Thus, in a social studies unit, science and mathematics subject matter may be brought in as needed.

How does team teaching relate to diverse means available in organizing the curriculum? A team of teachers may teach units pertaining to history only. There, a separate subjects curriculum is in evidence. Only a teaching team might teach arithmetic only in emphasizing a separate subjects curriculum.

To emphasize a correlated curriculum, a teaching team might teach both history and geography. The two academic disciplines are taught as being related.

A team of teachers emphasizing the fused curriculum might teach one of the following only:

1. the language arts;
2. the social studies;
3. mathematics; and
4. science.

To emphasize the integrated curriculum, the members of a team might include those who are strong in teaching social studies, mathematics, and science. The team must stress the relationship of subject matter in ongoing units of study.

1. Each academic area has its own unique scope (breadth of subject matter) and sequence (when content of a single academic discipline should be taught). To relate subject matter areas excessively, dilutes the significance of a given subject matter area.
2. Each academic area needs to be taught in depth. Depth teaching is recommended compared to survey methods. Pupils attach meaning to ongoing experiences if depth teaching and learning have been stressed.

Advantages given for a more fused or integrated curriculum include the following:

1. pupils perceive subject matter as being related and not as separate subjects. Academicians tend to divide subject matter into component parts, such as each specific academic discipline being an entity unto itself;

2. the divisions between/among academic disciplines are purely arbitrary, in many situations. Each academician tends to lean upon other selected academic disciplines other than the personal area of speciality. The divisions among academic disciplines are not clear cut.

Diverse Types of Teaching Teams

There are different types of team teaching. Cunningham² discusses four plans or approaches to team teaching implementation. The first is the team leader type. Two or more teachers plan the objectives, learning activities and evaluation procedures for teaching a given set of pupils. One of the members is designated the team leader. The leader is in charge of planning sessions. He/she also may receive more salary due to being incharge of the teaching team. Non-professionals, such as clerical workers and teacher aide may also be a part of the team. The team leader may teach in large group instruction, assist in small group work, as well as individual projects of learners. A team leader is selected on the basis of possessing leadership qualities and being knowledgeable in the area of curriculum development.

A second type of team teaching, as Cunningham³ calls, is the associate plan. Here, no one is designated the leader of the team. Leadership then becomes situational. In planning sessions, leadership emerges from each member in selecting objectives, learning activities and evaluation procedures. The strength of each member is tapped to teach in large group and small group sessions. Each member also assists learners with individual projects and activities.

A third type of team teaching is the master teacher-beginning teacher approach, according to Cunningham⁴. Here, beginner teachers have opportunities to become inducted into teaching with a professionally oriented leader of the team. The status difference between the master teacher and beginner teachers is quite implicit in the team arrangement.

The last team approach, according to Cunningham⁵, is the coordinated team type. Here, individual teachers in separate classrooms correlate subject matter, as well as plan cooperatively selected goals, activities, and appraisal procedures. Thus, teachers in a departmentalized plan of teaching

in social studies and the language arts may attempt to relate subject matter taught and move away, in degrees, from the separate subject curriculum.

To sum up, teachers and supervisors need to study and assess the philosophy of team teaching. Does it provide for the interests, needs, and purposes of each pupil?

The pros and cons of team teaching need thorough consideration. Do the pros outweigh the cons? Each plan of grouping learners for instruction has its strengths and weaknesses.

Diverse types of team teaching need analysis. The type ultimately selected needs to harmonize with each teacher's own unique teaching style. Also, the style of the learner needs to harmonize with the type of team teaching adopted.

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Programmed Instruction—Its Significances and Implications

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Introduction

The whole field of education is in a process of change. In a developing country like India, the growing interest for a switch-over from traditional methods of teaching to modern methods originating from educational technology, is one of the crucial developments taking place in the shadow of educational innovations. Research workers are confronted by severe methodological problems in conducting research in the area of teaching methods. Teaching is too complex an activity for its quality to be expressed in a single measure. The most comprehensive research up-to-date has been limited to examination of the teachers' performance in the classroom, ignoring certain other important factors like professional competence of the teacher, the relevance of a method to a given content-area, socio-cultural conditions under which the teacher functions, etc. However, educational workers have been busy for searching out and applying advanced methods in teaching-learning process. One of the important methods which is gaining momentum in many countries is the *programmed instruction* (P.I.) which can be introduced into our schools and colleges.

The concept of programmed instruction, in fact, emerged out of a series of experiments on operant conditioning carried out by Professor B.F. Skinner of Harvard University. As early as 1954, Skinner developed a teaching machine based on the scientific principles of learning. It led him to organize the subject matter with which the machine had to be fed. It is this care and concern for the organization of learning material

which ultimately resulted in the development of programmed instruction. As we shall see in the following paragraphs, this technique has almost universal acceptance and occupies a central place in educational technology.

In terms of classroom teaching, programmed instruction is essentially "*an attempt to provide instruction that is more individualized, more tailored to each learner's unique learning abilities and needs, and largely self-instructional.*" It is a means of utilising scarce skills, ensuring speedy learning and releasing teachers from the routine aspects of teaching and marking. It is a method of teaching of growing importance, which has its principles drawn mainly from the learning theories evolved by behaviouristic school of psychology. However, it is the Skinner's theory of operant conditioning which has much influence on it. The most important elements in this technique are: (a) that the subject-matter is based on careful analysis of the response it is desired to teach; (b) that the learning material is sequenced in finely graded steps, so that 5-15 per cent of errors are made in working through it; and (c) that the immediate knowledge of results is given to the learners.

Approach to Programmed Instruction

Since the introduction of programmed instruction technique into the classroom in the fifties (1950), several approaches to programming have come into existence. The most important ones are briefly discussed below.

(i) *Skinner's Approach*: Skinner's technique, known as '*linear*' or '*extrinsic*' programming, is based on his thoughts on learning. Skinner has shown how complicated patterns of behaviour can be taught, by reinforcing responses which are to be learned, and how behaviour can be '*shaped*' by rewarding fractional responses which are led nearer and nearer to desired performance. For Skinner, if learning has to take place, the desired response should occur and be rewarded immediately. In linear approach, the learning material is broken down into small steps designed to encourage correct response to questions. This style of programming is valuable in teaching facts, definitions, or basic knowledge necessary for learning skills.

(ii) *Crowder's Approach*: The second most popular method

of programming is the 'branching' technique by Norman A. Crowder, a technician of U.S. airforce in 1954. Crowder's intrinsic or branching method, which is self-contained differs from Skinner's method in not requiring every learner to read and respond to all the items. Crowder has adopted a multiple choice method, and provides along side the mainstream of the programme a number of branching programmes. If a learner chooses the wrong answer on an item or frame, he takes a branch of remedial teaching or goes over previous items. In this method, the gifted pupil can work faster whilst the poor learner would receive special instruction in his defective knowledge. This approach is best suited to learning situations involving a choice of solutions to a problem.

(iii) *Mathetics Approach*: As we swim deep into the types of programming, it is interesting to find that in the recent past, a totally new style of programming has emerged. It is the response-centred programme called *Mathetics*, evolved by Dr T.P. Gilbert (1962). Mathetics, originating from the Greek word *mathein* which means *to learn*, is "*the systematic application of re-inforcement theory to analysis and re-construction of complex repertoires which represent mastery of subject matter.*" It is an innovation in programming, in which the learning outcome or results can be linked to concrete goals which we desire to achieve. The mathetics approach lays emphasis on the students success at 90/90 criterion level through constant motivation. It is generally best suited in teaching wide range of subject matter and more particularly in the teaching of skills, analysis of behaviour, and in construction of teaching-exercises.

Pro(s) and Con(s) of Programmed Instruction

The introduction of programmed instruction is of great importance to educate millions of masses and to overcome the shortage of trained teachers. As the UNESCO Education Commission report points out "the accelerating and multiplying effect of new techniques of reproduction and communication is basic to the introduction of most educational innovations. The future of education lies in devising educational institutions which combine industrial or technological efficiency, centred on the acquisition of knowledge, with the

vitality of creative groups whose action will enable human relations to evolve." Failure to evolve a strategy to introduce educational technology into educational system would imply a tendency to prepare the students for the world of the past rather than for the future. Innovators view programmed instruction as a means for emancipating the learner in new ways; the learner becomes more independent and self-directed in his studies when he is taught through programmed method. At a time when our schools and colleges are becoming increasingly aware of the need of educational technology, the main benefits which can be derived by introducing the programmed instruction technique are:

- (i) the subject matter can be presented in such a manner that the learning becomes an interesting game, in which the student is challenged by his own abilities. Learning through a new method provides extra-motivation to the student;
- (ii) the problems of individual learner can be diagnosed easily, as scoring is done item by item while the learner proceeds through the series of steps;
- (iii) programmed instruction can help in solving the problem of individual differences to a great extent. Both fast as well as slow learners can learn at their own speed. Programme can be designed with steps small enough for below-average students to take; yet, if the subject matter is at the desired level, bright pupils are not bored by it. Rapid progress keeps alive their interest; and
- (iv) programmed instruction increases the role of the classroom teacher. The teacher will be able to spend more time than had ever previously been possible in enriching the learning of the faster learners and in providing remedial work for the slower students.

Further, the programmed instruction technique can direct the learning towards achieving specific objectives. If the objective is to provide drill on some mathematical problems or linguistic formalities, the learners can do the work themselves,

making it unnecessary for teachers to spend their time explaining and drilling on the hundreds of details.

Although the concept of programmed instruction has not yet made massive inroads into our educational system, the educational critics have not spared it from criticism. It is argued that 'teaching will become a process of grinding the subject matter into a kind of baby food and spooning it out to learners who will never learn to eat for themselves'. Some critics believe that while the method may be effective for learning facts and understanding principles, it does little to encourage original thought, initiative and imagination. The learner is rather led through a programme along a narrow path towards a definite goal, and is given no particular encouragement to ask his own questions, and to seek and discover the answers, for which a discovery method is specially suited.

However, when viewed positively, programmed instruction has far-reaching implications for educational practice. One of the most important is *individualised learning*. Programmed instruction is not merely a technique, although it has implications for educational technology. But it is also a philosophy for educating the individual student on the lines of psychological analysis of teaching-learning process. In the implementation of individualized or tutorial instruction, programmed instruction serves as an innovation. It makes a sharp impact on the mode of writing texts, the organisation of school curricula, and on training of teachers. Programmed instruction has the potentiality of changing the role of *teacher* and the *learner*. The role of the teacher changes from that of classroom instructor and/or source of all knowledge to that of designer of programmes. Most programmed instruction is *self-instructional*. Thus, learners are self-sufficient and independent of the teacher. They proceed at their own pace with the materials and usually evaluate the accuracy of performance via an answer-key or compare their performance with an acceptable model. The teacher is asked not to lecture, except at points designated as guided discussions. In short, the teacher becomes a resource-person rather than a delivery-system for subject matter.

Similarly, the learner's role also undergoes change. The

learner, instead of being a passive recipient, becomes an active learner interacting with the material. While it is possible to sleep through a lecture unnoticed, it is very difficult to get away sleeping through an hour during which he is supposed to be working on programmed materials. Moreover, since the learner responds frequently with P.I. (as opposed to infrequently with lecture), the distinction between what is 'presented' and what is 'learned' becomes very clear. In other words, the learners learn everything that is presented. With programmed instruction, the requirement to demonstrate what is learned is continuous; and if there is any discrepancy between what is presented and what is learned, it shows-up immediately.

Optimistic Expectations

Although the concept of programmed instruction has flashed upon the educational scene only in recent years, its significance is widely felt and growing. Programmed instruction has systematically objectified and materialized many emphases that have long been identified with instructional improvements. Because programming is a *system* of emphases and empirical procedures, its promise is greatest when there is appropriate total adoption. However, the traditional reaction of education to innovation is to pick and choose from among its elements, to *adapt* rather than *adopt*. Even if there is no wholesome implementation of the PI technique in the very near future, its steady growth along the following natural lines and areas of development appears to be inevitable.

Systematic Approach for
Instructional Improvement

Instructional Research

Behavioural Studies of
Curriculum Design

Teachers role in Program-
med Instruction

Facilities for Self-Instruc-
tion

Group-Paced Instruction

Uniqueness and Importance
of Machines, especially
Computers

Pre-Service and In-Service
Teacher Education in Pro-
gramme Production and
Utilization

In the above areas of development, promise and excitement

Programmed Instruction

typically outrace actual accomplishment. Looking into the future, one can feel that if programmed instruction is to be extensively used in schools and colleges, then, many developments will have to occur. Psychologists and others interested in the development of basic programming principles and procedures will have to expand their work and study in order to lead the way in showing how programming can be applied more broadly and basically. It is also likely that such persons, working in collaboration with subject-matter specialists, curriculum-design specialists, and master teachers will actually have to be the ones to develop the new curriculum '*programmes*' that are envisioned. At the same time, more teachers and other educators will have to become familiar with the principles of programmed instruction.

Conclusion

To sum up, education is the one major activity, which in our country is still largely in the handicraft stage. An obstacle to the rapid introduction of technology into our education is the structure of Indian education system itself, which appears 'ideally framed to resist change'. Given the chance, programmed instruction can not only enable effective teaching in over-crowded urban schools, but can also provide remedial education for all, or rather education so individualized as to make remedial teaching in actual subject-matter necessary less often. The system of mass instruction can be revolutionised. Moreover, in our rural schools, a new lease of life can be provided through programmed courses in special subjects, like the community development, rural housing etc. Especially, in our expanding rural adult education programmes, programmed instruction is very useful. Many adult learners are rather reluctant to learn in competition with others in a group. *Programmed Instruction* does not expose a person's weaknesses to others; but rather helps the adult to get satisfaction of success and progress.

An important task of schools is to make learning more interesting and rewarding, and this aim has to be achieved with available scarce resources. To quote J.P. Naik, "this seems to be asking for the impossible, but it is not really so,

because modern technology of education can provide techniques whose cost is far too small in comparison with their effectiveness. Programmed learning is one of the answers to this important problem."

In facing the challenges of several new subjects introduced in recent years in our schools and colleges, and in coping up with the variety of learners, programmed instruction can ensure better learning than conventional methods, sometimes with a saving of from a third to two-thirds of the normal time spent. In our country, as the Kothari Education Commission (1964-66) suggested, programmed instructional materials in various subjects need to be developed in a massive way. This would enable us to assess the suitability of the technique to Indian education system. Application of programmed instruction technique would go a long way in modernization of teaching procedures. Programmed material, prepared and guided by experienced teachers, is a cheap and effective mode of instruction, of which the possibilities can be revealed. The technique can be a helpful adjunct to prevailing methods of teaching, and can enable teachers to place greater emphasis on individual testing and individual remedial work.

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Programmed Learning and the Classroom Teacher

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In a developing country, advances in education create two problems—quantitative expansion and qualitative improvement. No educational administrator of any significance has pressed for mere expansion without regard to quality. Similarly, advocates of quality have never ruled out the need to universalize education. All educational advances require money and they seem expensive in terms of available funds. It is a truism that the physical limitations are more serious than the financial ones. In India financial resources are scant, no doubt, but it is easier to get money than to find teachers and equipment.

It is sometimes alleged that the milometer and the speedometer of the educational automobile are not working properly. The 'milometer stands' for cumulative improvement in the learning process. The 'speedometer' may mean the rate of learning. The former refers to the products of learning, while the latter refers to the process and pace. Both aspects must be considered while planning for efficiency in education and for 'investment in man'.

A Complete Learning System

Could programmed learning help to increase educational efficiency in India? The answer to this question is likely to be in the affirmative. Proponents of programmed learning maintain that this technique can be adapted to homework and so can free the teacher from devoting time to the correction of assignments. Programmes can also be used by temporarily homebound students who are unable to attend

classes for valid reasons. Programmes could be used with profit in rural schools where, perhaps, a non-science teacher or an untrained teacher has to teach science. Programmes could also be used for enrichment of a school curriculum for the gifted, who may learn on their own, this being a unit which does not form a part of the regular course. The underachievers, on the other hand, can try to catch up with their superiors with the help of programmes. Programmed learning is concerned with the selection and arrangement of subject-content based upon theories of learning. It is a process by which sequences of instructional material are constructed in a way that maximizes the rate and depth of learning, fosters understanding and the ability to transfer knowledge to new situations, facilitates retention, and enhances the motivation of the learner. It is an explicit process which is designed to be self-contained and self-sufficient so that the learner can progress through active interaction with the stimulus frames.

Programmed learning, unlike many of the nostrums suggested for education, is a technique firmly based on educational theory. This point needs to be emphasized because there is a general impression that programmed learning and its vehicle for presentation, the teaching machine, are merely bigger, better and technologically modified audio-visual aid. On the other hand, it is considered a complete learning system based on principles of learning derived from strenuous experimentation. In fact, many teachers develop an understanding of the principles of learning and teaching by personal experience; they are little influenced by theories of learning. It is difficult to say which principles of learning would help teachers in teaching, for instance, the Pythagoras Theorem, or the International Date Line. This paper discusses how an average teacher is likely to profit from an understanding of the principles of programmed learning. The discussion is divided into three aspects which form the basis for understanding the mechanics of programmed learning. They are:

1. Classifications of objectives of learning.

2. Reinforcement and classroom learning.
3. The principles of active learning.

Classifications of Objectives of Learning

The theory and practice of programmed learning effect the functions of the classroom teacher at the conceptual and at the behavioural levels. The former is concerned with the understanding of the classifications of the objectives of learning and the outcomes, while the latter is concerned with what a teacher does in the classroom.

Programmed learning demands concrete objectives in terms of definable changes in the behaviour of learners. It makes the whole business of education much more explicit. It is likely to lead the teacher to a new consciousness of objectives and methods. The objectives of the programme are stated in terms of what the student should be able to do, rather than simply what it is hoped he will understand. Below is given an example of the way in which the objectives of a programme on 'The Difference Between Mass and Weight' may be stated. After completing the programme the pupils should be able to:

1. state at least two differences between mass and weight;
2. differentiate between units of mass and those of weight;
3. define 'mass' and 'weight';
4. distinguish between matter and non-matter; and
5. recognize that 'mass' is scalar and 'weight' is vector.

Such a practice of stating the objectives of teaching a unit contributes greatly to the making of a good teacher. Alice L. Foley, Director of Instruction, Brighton District No. 1, is right when she says: 'I am certain that any teacher who does some programming will be better teacher when he has finished the work'.¹

Dr John Blyth, Professor of Philosophy, Hamilton College, New York, said that in two years of programming information for his students he has learned more about teaching than he did in all his previous twenty-three years of classroom experience.²

Such observations stem from the fact that to programme a unit the teacher has to think from the point of view of the learner to the desired goal.

Furthermore, a good teacher presents the subject-matter in what he considers the best teaching sequence. This may vary from apparent logical sequence. It involves breaking the content down into small steps, gradually building upon the knowledge which the pupils have acquired. Such an objective-oriented pursuit of teaching is likely to be more rewarding, and it should be looked upon as an important practice in preparing and planning a programme.

Reinforcement and Classroom Learning

While experimenting with animals, Skinner prepared the subjects by a period of food deprivation. Food was then used as a reinforcer. At the heart of any learning programme lies the practice of reinforcement. Among humans, food, money, grades, medals, or merely the knowledge of being 'right', all serve as reinforcers. Programmed learning has emphasized the last type of reinforcement. The more quickly reinforcement follows the desired performance, the more likely it is that the behaviour of a pupil can be developed or shaped by differential reinforcement. Skinner's reinforcement theory is the successor to Thorndike's Connexionism, both in orientation and in specifying techniques which can be employed by teachers to promote learning. Moreover, it is in some ways a reflection of Dewey's Instrumentalism.

Many researchers have reported the advantages of immediate reinforcement given to learners. Greenspoon and Verplank³ have experimentally increased the frequency of a certain kind of verbal response by uttering 'uh-huh'. In another report Smith⁴ describes how children of six and seven with an I. Q. below 50 were successfully taught to name common objects when reinforced with a buzzer for a correct try.

There is unanimous agreement that immediate knowledge of results is superior to delayed or no knowledge in many kinds of tasks, e.g., paired-associates. Teachers should take note of all these findings which seem to suggest that even a short delay may reduce the effectiveness of correcting mistakes

in composition notebooks and examination answerbooks. The findings also point to the need for providing test results as soon as possible. Examination, in this context, should be looked upon as a culmination of the learning process rather than a procedure apart from learning. Sometimes examination results are declared after a long vacation. In such cases the knowledge of success hardly helps the process of learning.

The Principle of Active Learning

Most educators believe that in the ideal learning situation all pupils should be actively and continually involved. Normal classroom procedures do not usually provide this opportunity, but it is an essential ingredient of programmed instruction. There is constant interaction between the programme and the learner. The programme does not simply present something to be learned, it includes sustained activity. Skinner advocates the principles of active responding, which means that the pupil learns only that which he is led to do. An important condition of learning is suggested by the phrase 'learning by doing'. The pupils should not remain passive. One cannot learn to type simply by reading or hearing instructions, but by typing. In a normal classroom setting, much of teaching consists of a teacher talking and pupils listening. Teaching is reduced to 'bombardment of stimuli' by the teacher who does not wait for responses from the pupils. Textbooks resemble lectures in that, although they present a chain of stimuli, readers rarely make active responses to them. Contrary to this, a programmed text keeps the reader active. As Skinner puts it: 'The student is always alert and busy. Like a good tutor, the machine insists that a given point be thoroughly [understood, either frame by frame or set by set, before the student moves on. Lectures, textbooks, and their mechanized equipments, on the other hand, proceed without making sure that the student understands and they easily leave him behind.'⁵ The principle of active responding has its implication in the context of classroom teaching. Socrates, the first programmer, tried to keep the slave boy active and alert by resorting to a chain of thought-provoking questions. Socrates says, 'I shall only ask him, and teach him, and he shall share in the inquiry

with me; and you watch and see if you find me telling or explaining anything to him instead of eliciting the opinion.'⁶

The future of programmed learning rests with the classroom teacher. Its value is increasingly recognized by educators. An important by-product would be the transfer of understanding of the principles of programming in day-to-day classroom teaching to other fields. There are other benefits that a classroom teacher can expect. Programmed learning optimizes conditions for individual learning. Moreover, programmes can provide the pupils with subject areas which are loaded with information and memorization, thus giving the teacher more time for conceptual understanding of the subject-matter. Curriculum enrichment would be another advantage. For example, schools do not have time to give the pupils lessons on 'traffic rules', 'using telephone directories' or 'the use of the railway time-table'. Programmed learning is based upon the same principles as good classroom teaching. Far from replacing the teacher, it could be a positive help to the teacher who can appreciate its fine points.

One cannot conclude this paper better than by quoting Thorndike. He writes:

'If, by a miracle of mechanical ingenuity, a book could be so arranged that only to him who had done what was directed on page one would page two become visible, and so on, much that now requires personal instruction could be managed by print. A human being should not be wasted in doing what forty sheets of paper or two phonographs can do. Just because personal teaching is precious and can do what books and apparatus cannot, it should be saved for its peculiar work. The best teacher uses books and appliances as well as his own insight, sympathy and magnetism.'⁷

Let us hope that Indian teachers will appreciate Thorndike's advice given long before teaching machines came into vogue.

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Curriculum Development Through Systems Technology

M. Mukhopadhyay

There has literally been enormous literature written on both educational technology and curriculum in the last few decades. Issues like systems approach, media and model of learning designs, software/hardware controversy as related to educational technology; and various approaches to curriculum development, e.g., subject based, need based, broad based etc., have been often discussed. In this chapter, we fix our frame of reference to elaborating the process of curriculum design and development with the help of relevant contributions of educational technology. In the present framework we do not wish to either review the definitions or define educational technology or curriculum development. The actual detailing would eventually indicate the particular aspect of the educational technology being used in designing and developing the curriculum, and also the basic approach of the curriculum design and development being followed. In a way, effort will be made to apply 'systems technology' to the development of a 'need based curriculum' with provision of futuristic needs and disciplinary structures.

Systems Technology

Educational technology as a problem solving approach wishes to view the educational systems in its totality and achieve the educational goals through suitable designed modes and media of learning (Rowntree, 1974). The former part has been termed as the 'systems technology' and the latter issue as 'tools technology' in order to put the issues "in their right perspective." In the present context the *systems model*

is being applied to the design and development of the curriculum. To begin with, it would be relevant to look at the Instructional Process Model through systemic view to identify the place of curriculum in the total context. The following diagram illustrates the model with curriculum as the input, rather as a major input.

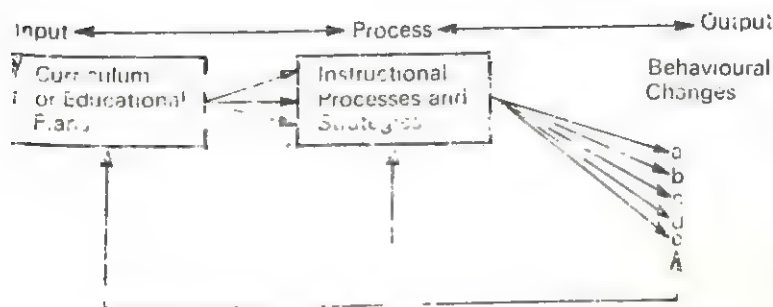


Fig. 1 Instructional Systems Model — Curriculum as Input

The figure 1 implies, among many other things, curriculum as an inseparable part of the total educational system which cannot be, possibly, designed in isolation to other aspects of the system and secondly, the achievement of objectives in the form of expected behavioural changes is the function of curriculum and instructional strategies meaning thereby the interrelationship between these two components.

Following the systems model, further, our present concern is to get curriculum as the output. To that purpose, output should be a definable and measurable product. Thus curriculum as the output should be some form of written document which will enumerate the major inputs or designs of inputs in the total instructional process. Hence the systems model, in its preliminary form, for development of curriculum can be presented in the following diagram.

The process dimension of the above figure is the major concern of this chapter. This is further elaborated below.

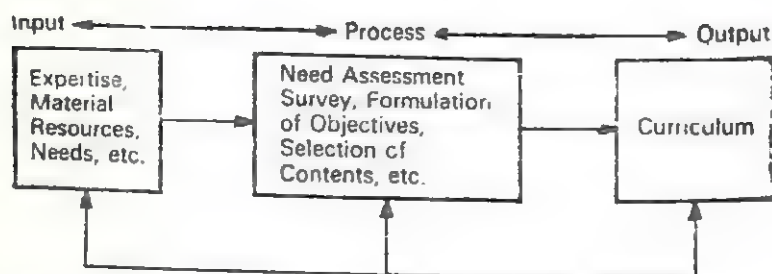


Fig. II. Curriculum Development Model – Curriculum as Output

Curriculum Development

Curriculum as a *writer document* elaborating at least the sequence and structure of learning contents is the product of certain inputs and processes. Applying the same systems model for the purpose of developing the curriculum, the needs and the details of the process have to be considered in order to develop a scientifically designed and valid curriculum. We would deal with the process of development of the curriculum primarily from the need based approach and the model that can depict the approach with systems technology can be seen in figure III ahead.

The model given above, specifies several characteristics of the process of development of curriculum. Firstly, it depends upon diagnosis of needs—both present and future. Secondly, the sequence and structure of the content are dependent upon the objectives formulated out of the needs. In a way it eliminates, rather derecognises, the usual committee approach to 'writing curriculum'. Last but not the least, it has a built-in research and development approach where the need assessment, topic level validation, evaluation and so on are research components, and defining the educational goals and objectives, choosing and sequencing the contents, monitoring the implementation of curriculum and so on are the developmental activities. Some of the important components of the process of curriculum development which need special and detailed consideration are discussed below. The design of learning primarily would have two components—content and instructional resources, and strategies. Out of these two components, content would be the main issue of discussion in this chapter.

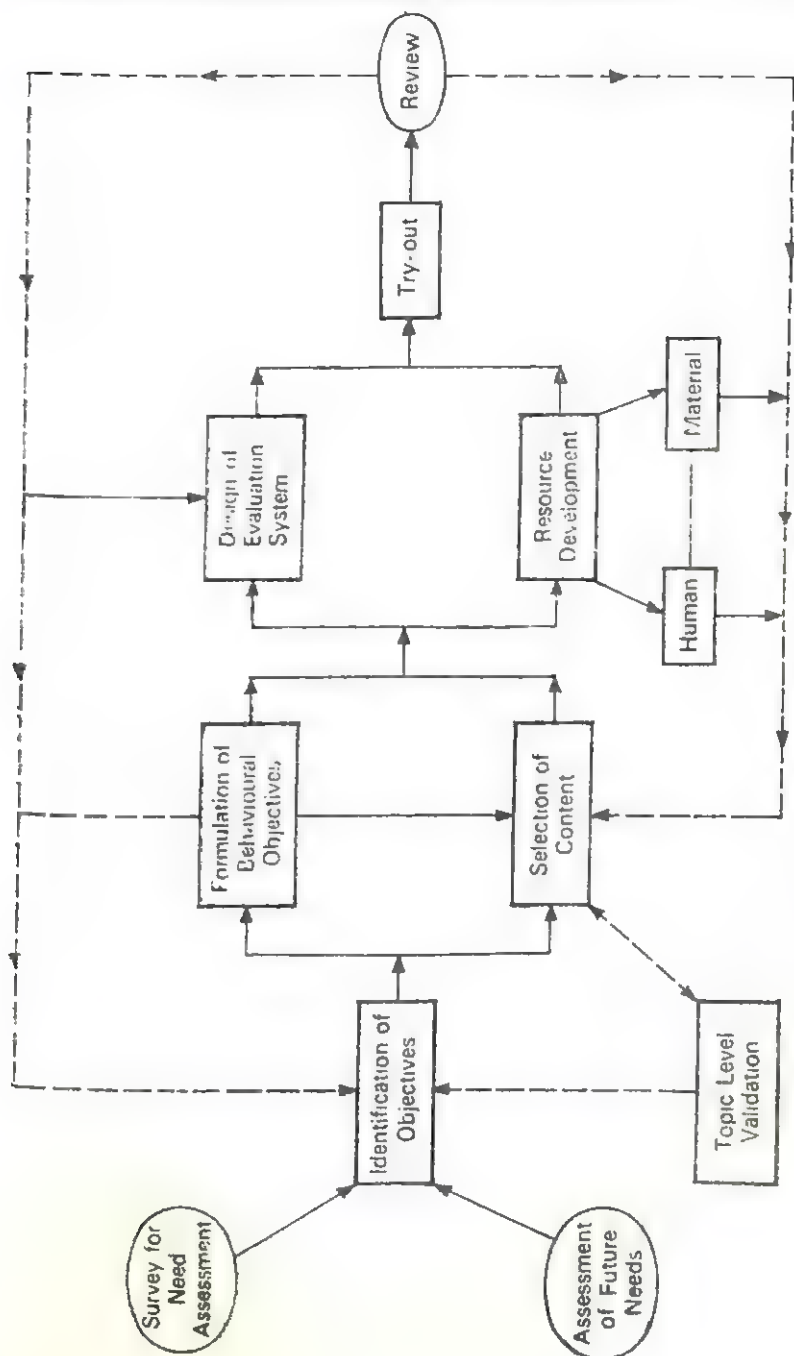


Fig III. Curriculum Development Process (Adapted from Saran Y 1976)

Assessment of Needs

The educational needs have to be seen from at least two major angles. Education has been termed as an agent of social change. To make education serve this end it must reflect the society need which is dependent upon the conservation as well as progressive functions of the society. Simultaneous to this is the educational need of the individual. These two aspects need not be treated as contestants. In fact, educational planning exercise is primarily geared to find a meeting ground of the two needs and in a complementary manner. If we try to appreciate social needs and personal needs as a continuum and on one axis, the present needs and future needs is the other dimension. Certain needs are essentially on 'here and now' basis, e.g., students' need ability of basic numerical operations. Whereas certain needs might be related to adult role, e.g., developing leadership abilities. While framing the curriculum as it happens today, the 'experts' discuss such things. But whatever is the decision about needs—it reflects the thinking of a select group of people. The approach which is preferred is to conduct a survey of the needs from the community; and skills of data collection and analysis can be employed to identify the needs—both social as well as personal. Paulo Friere's *Pedagogy of the Oppressed* is an excellent example of the method of need assessment through the community.

Objectives

The needs once identified lead to the formulation of objectives. To the extent the needs are varied, any educational system and process would have a series of objectives. Some of the objectives are for the system as a whole. Certain others pertain to only some components of the system and/or process.

The three main categories in which such objectives can be classified are Policy Objectives, Subject Objectives and Behavioural Objectives.

Policy Objectives: are those which specify what needs the 'system' intends to satisfy; methodology or broad *modus operandi* of satisfying the needs; and how does it intend to evaluate whether specified system need is satisfied.

Subject Objectives: intend to fix the targets which can be achieved through certain subject (contents of a discipline).

Behavioural Objectives: are the ones which are stated in categorical behavioural terms which are to be achieved by the individuals through rather smaller units and topics of contents.

Whatever is the nature of objectives—two fundamental questions are where do we look for (sources) identifying the objectives, and how do we decide what objectives to choose (worthwhileness).

Sources of Objectives

The objectives of education essentially arise from perception of future, particularly of the society and the individual, among the members of the society and the members of the educational system. One of the major sources is the societal needs which can be either determined in terms of things like manpower needs and also according to the social structure visualised to be developed. Second source of objectives can be the task analysis of adult roles—professionals, experts and household. Depending upon the level of education, either certain specific professional skills or competencies (for higher and professional education) or a set of competencies which cut across vocations and professions (for school level) can be identified. The third major source is the structure of disciplines—the contents of a subject. Call it another source or a ~~source~~ for the previous three sources (Rowntree, 1974) the individual needs, interests and latent capabilities are very important factors in identifying and determining objectives.

Worthwhileness of objectives: it is a rather intricate philosophical issue. Whether an objective is worth achieving or not depends upon a number of beliefs, and assumptions about the future of the society and also on certain basic ideological convictions. For example, when more than 92 per cent of our workforce in non-agricultural sector have less than high school education (it is more in agricultural sector), should secondary school system impart training in vocational skills so that our production sectors are provided with adequate semi-skilled workers? Whatever is the policy regarding this issue the societal apathy to the objectives of skill development

through schooling is evident in very low enrolment in vocational and technical schools. Other considerations in determining worthwhileness are the feasibility, practicability, testability and so on.

Levels of attainment of objectives is a succeeding issue now. Most of the objectives can be achieved at different levels. For example, an objective of developing reading speed can mean different speeds at standards V, VI, VII and so on. So it is essential to develop criteria or level of performance of the objectives. The level of performance thus decided would need to be assessed and as such assessment—the design and actual construction of tests becomes a consequent activity.

The contents and instructional process form the bridge between the objectives or targets set with fixed level of performance and the present position of the learner. So determination of content and instructional process, which together forms the design of learning, is an important process component.

Design of Learning

The design of learning has been outlined in terms of content, and instructional strategies. Before we elaborate

TABLE—1
Analysis of Behaviour Objectives in terms of
their achievability through Contents and
Instructional Strategy

Objectives— Behavioural	Can Be Content	Achieved By Instructional Strategy	Needs Special Resource Support
a. Reads/comprehends simple English passages			
b. Collects relevant information on a problem			
c. Handles simple hand tools, e.g., screw-driver, wrench etc.			

topics and so on. The prerequisite to all the types of reading material could be vocabulary development exercises. Now, depending upon the level of the competence, certain contents can be made essential minimum, certain others as supportive and few others as optional. If we continue this exercise on series of objectives, we would get a matrix of the following types.

Now, we have a series of topics, and in some occasions certain learning units. The next is to validate the topics selected for each objective.

Topic Level Validation

The contents have been developed through the analysis of objectives. The purpose of topic level validation is actually to cross-check the link between the two. For example, topics relevant to problem solving or critical thinking can be identified. Correspondingly, certain live-situations can be identified from both institutional life or adult life, and examined how far the topic or topics selected to help develop these abilities fulfil the expectation. In a way, this is actually to estimate the adequacy, gaps (probably overlaps also) of the topics selected in the content. This can be done by some kind of survey incorporating questionnaires, observations, interviews, and content analysis. In fact, such kind of an exercise is likely to help in detailed analysis of the content and structuring of the contents.

Discipline Structure

Having thus framed a detailed structure of the curriculum we would face a dilemma—should the curriculum be only need based (needs as derived from the objectives) or it should reflect the 'structure of discipline' also. For the elementary grades the curriculum may be primarily need-based. But for secondary and higher grades the structure of the discipline needs to be reflected. To do so, the topics selected can be clubbed according to the disciplines and wherever there is a gap or inadequate linkage it can be filled up. In order to maintain the basic approach, each subject, preferably each topic, should be accompanied by the corresponding set of objectives. More often than not, objectives, in order to be

achieved satisfactorily would demand certain specific instructional strategies with respect to each topic or a set of topics.

Instructional Strategies and Resources

In a systemic view of instructional design, the objectives, content and instructional strategies are inseparable components. In fact, these are complementary in the systems model, content being the input and the strategies of instruction being the process leading to the output in the form of knowledge, skills, change of behaviour and so on as specified by the predetermined set of objectives. Designing instructional strategies is a major concern of educational technology bringing in several issues and possibilities related to learning. An elaborate treatment on strategies of instruction has been given elsewhere in this book. We would, hence, now switch over to examine the issue of curriculum evaluation.

Curriculum Evaluation

Curriculum evaluation and reform are the last two important components of the total process of curriculum development and design. And these two steps, though the last in sequence, are ironically responsible for making curriculum design and development process a continuous one. The design of evaluation also depends upon the framework of the curricular design. In this paper, the approach has been to consider the achievement of objectives as function of content and instructional strategies. As such, it would be necessary to design strategies to evaluate the process of implementation of the curriculum before any summary evaluation is made of the effectiveness of the curriculum with respect to the achievement of the educational goals and objectives fixed earlier. The evaluation plan and procedures are usually considered in two stages and two broad ways:

1. *Formative Evaluation:* This is an evaluation of the ongoing process of the curriculum development and implementation. It is primarily meant to provide feedback to the process of monitoring the curriculum. It can reflect on the basis of scientific data the relevance, adequacy, etc., of objectives, relevance and

sequencing of topics, instructional strategies, evaluation of learning outcomes, etc.

2. *Summative Evaluation:* After having a properly monitored implementation of the curriculum, it may be necessary to ascertain the actual level of attainment against the expected level of attainment. This is terminal in nature. It is, in a way, a product evaluation either with reference to product of previous curriculum or against a set of criteria evolved.

In a recent study, by Mukhopadhyay et al., the model of curriculum evaluation that has been adopted is given in figure IV.

The model is self explanatory indicating Phase I as formative evaluation and Phase II for monitoring revision. The

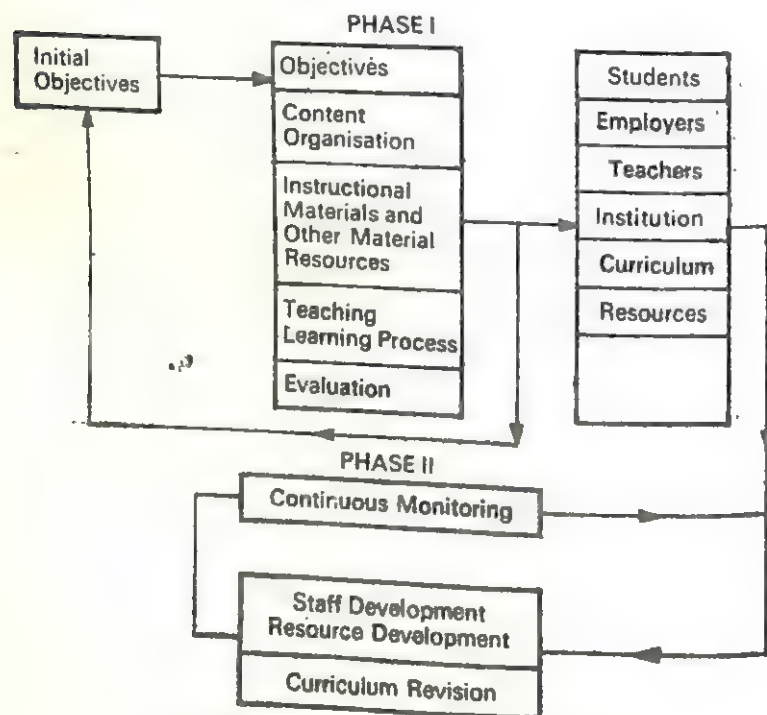


Fig. IV. Curriculum Evaluation Model

items in each of the small cells (in Phases I) indicate the areas and people of formative evaluation.

Conclusion

We had set out in this chapter to examine the process of curriculum development from the perspectives of systems technology. The main points we have tried to drive home are:

- (i) in such an approach one must adopt a systems design where objectives, contents, teaching strategies and evaluation have to be seen as integral parts of a total system;
- (ii) in identifying the educational goals and objectives, certain philosophical and pedagogical considerations must be given due importance;
- (iii) in designing the structure of the content, a more scientific and research based approach is to be adopted compared to the prevailing practice of expert committee approach;
- (iv) future needs of both the society and individual are to be given adequate importance, and
- (v) finally designing of curriculum evaluation should be made a necessary step in curriculum design and development.

Suggested Readings

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Computer Aided Instruction

M.S. Sonar

New ways of assisting the students to learn are explored continuously. When we apply instructional approach and try out new materials it is generally observed that students react differently. Materials which stimulates learning in one student may be found by another student difficult to understand and the third may find it too simple. Educators had already recognised that wherever practicable there should be individualized instruction. However, a teacher with one or more classrooms of students will find it very difficult to give adequate attention to daily needs and progress of individual students. Due to population explosion and increase in school enrolments since independence, the question of how to handle learning activities and problems of students by few teachers is vital. It is quite possible in future "many to one" dilemma will be a major research area.

There are many educationists and psychologists who have been trying to find out ways in which electronic information processing may help the teacher in individual instruction. One of the important and prominent approaches is to use computer as a teaching machine. This approach is referred to as computer aided instruction or computer assisted instruction abbreviated as CAI. It is an exciting new area for behavioural scientists.

Computer aided instruction (CAI) is not the panacea for today's educational problems. Computer aided instruction is a substantial innovation. A computer is a high speed data processing machine. The first large mechanical computer called as an analytical engine was designed during the

nineteenth century by Charles Babbage, a British mathematician, for computing astronomical and mathematical tables. The equipment was not so much successful.

During the latter part of the nineteenth century Herman Hollerith developed a machine for processing cards on which information was stored by means of punched holes. The machine was used to speed the tabulation of census results in U.S.A. Improvements have been made over the years and the card processing machines are used in many educational, commercial and scientific activities.

One of the early computers operating on the basis of electric pulses rather than mechanical switching, was placed in operation at University of Pennsylvania in 1946. The machine was given the name of ENIAC (Electronic Numerical Integrator and Computer).

Research and development were accelerated in efforts to achieve improvements in memory ability and speed. John von Neumann, a well-known mathematician, made significant contribution to logical design of computers. Remington Rand introduced in early fifties the UNIVAC and International Business Machines (IBM) began to manufacture computers.

Characteristics of a Computer

Many people ascribe human-like qualities to the computer. Computer possesses no inherent reasoning ability; therefore, the notion that computer is an intelligent machine is a misnomer. If the intelligent quotient of the computer is measured the value would be zero. Computer is not a thinking machine but can be rightly described as thinking man's machine. Man behind the machine is more important than the machine itself.

The computer has unusual flexibility. It can be programmed to manipulate data in unlimited ways. The programme consists of instructions which direct the computer to process data to solve the problem. A programme may have few or many instructions. Instructions making the programme are prepared by human beings. The process is known as programme writing.

In the case of small computers, there may be only few instructions (approximately 10 to 12); while in large computers

there may be 200 or more separate instructions built in electronic circuits. The instructions within the programme are carried out sequentially.

A programme of statistical computation or data manipulation is carried out with extremely high speed. The time for one instruction is measured in microseconds or millionth of a second depending upon the computer. The speed of some new computers which are very costly is measured in billionths of a second.

Computer has an ability to store the data electronically which can be retained indefinitely without loss of detail. Computer memory is erasable. Stored data can be replaced within few microseconds.

Computer is a two state device and therefore, binary system is used to encode numbers and alphabets, e.g., 1 to 5 numbers are encoded in binary system as shown below:

<i>Decimal Value</i>	<i>Binary</i>		<i>Place</i>	<i>Value</i>	
	10	8		2	1
1					1
2				1	0
3				1	1
4			1	0	0
5			1	0	1

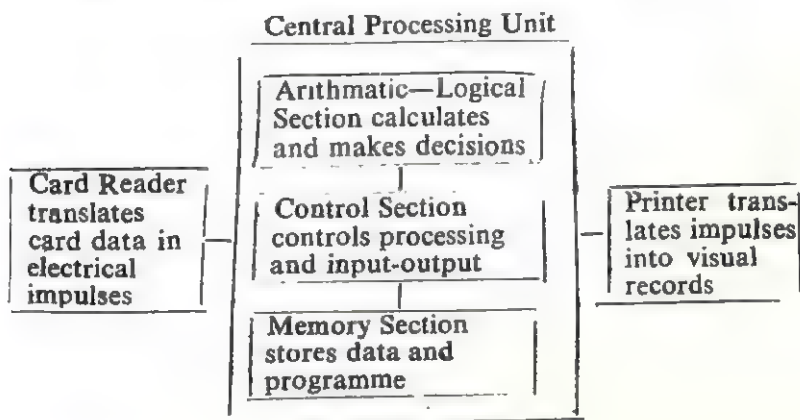
Alphabets A B C D E are encoded as follows:

<i>Letter</i>	<i>Memory Bits</i>					
	1	2	3	4	5	6
A	1	1	0	0	0	1
B	1	1	0	0	1	0
C	1	1	0	0	1	1
D	1	1	0	1	0	0
E	1	1	0	1	0	1

Arithmetic operations, such as additions or subtraction can be carried out directly upon binary numbers.

Flow of Data in Computer

How the data is processed in computer is shown in the simplified illustration of computer, below:



Computer consists of arithmetic, memory and control sections. A card reader is used for bringing data into the computer and printer for preparing printed record. The whole equipment together is called as *hardware*.

Preparing Programme for the Computer

Using a computer depends much upon the brain power of human beings. If you wish to find out a solution to your problem through computer you will have to define the problem precisely and will have to understand the solution in all details. A programme written for a computer is called as software. If the problem is not solved correctly by computer, it is normally the fault of software.

Every computer has a number of specific instructions which are specially coded usually with a combination of letters, digits or symbols for example:

Operation Code

Meaning of Code

1	Add
2	Sub-tract
3	Multiply

4	Divide
5	Clear and add
6	Read a card
7	Print a line
8	Transfer
9	Store accumulator

Major 'modes' of CAI use

The character of CAI system depends upon the ability of the computer to provide two important capabilities, i.e., memory and logic.

Features can be best seen in six major modes of use in CAI instruction.

1. *Problem solving* can be readily achieved provided the typical computational capability of the computer is available and there is a typewriter and display response device with remote control of two way communication.

The students need to know how to communicate with computer and how to solve his problem.

2. *Drill and Practice* can be achieved through the use of CAI if the system is programmed to handle the particular drill and practice materials selected or developed by teachers. The programmes are designed to build skills and give the students practice that teacher wants. Here teacher uses the computer and therefore he must know computer language.

3. *Inquiry* is mode of third type of CAI application. In this CAI system responds to student inquiry with answers it has stored. In this mode instructional staff must learn how the system operates.

4. *Simulation and gaming*: In this mode teachers formulate a model of some real or idealized complex situation. The student must learn to work with such complex situation and interpret. A game may not represent a particular business of interpersonal interaction.

The simulation, on the other hand, attempts to represent a real situation. To implement this mode a computer programme must be written to process students' input to get a meaningful output. This output is determined by the action of students. Students interact with their natural language.

5. *Tutorial Instruction*: In this mode, the instructional staff takes responsibility for student's instruction. The logic of instruction is to be formalized and to be entered in the system. Tutorial mode is Socratic in its dialogue with student. In designing this mode the instructor must be familiarized with computer language. He must formalize a philosophy of teaching and specific strategies.

6. *Author mode*: CAI is used to support instruction by generating sets of materials for a student's use. In generating concept learning materials, there might be sentence forms which have blanks in them each of which is to be filled by a word or a set of words, i.e., inserted into the blanks by computer according to the set of instructions.

Advantages of Computer Aided Instruction (CAI)

The main advantages of a CAI system are related to the degree to which it permits the individualization of education, particularly instruction.

1. The capability of individualizing both the means and ends of instruction.

2. The capability of doing research:

- (a) on teaching under controlled conditions,
- (b) under conditions which individualize instructions in a particular way,
- (c) on various modes of teaching,
- (d) ability to collect detailed records of student performance,
- (e) permits evaluation of effectiveness of the teaching procedures as well as teaching materials.

3. The capability of developing ways of assisting teachers and authors in the development of instructional materials.

4. The capability of evaluating alternative media used to implement and support instruction.

The Computer and Education

How can and how should the computer be used in learning situations? Computer aided instruction means *using computers to*

teach people, it does not mean teaching people to use computer or teaching people about computer technology.

Computer can be used in education in two different ways:

- (i) to reinforce present educational system,
- (ii) to revolutionize the present educational system,
- (iii) to lay the foundations for future systems of education to come.

If we introduce CAI into present system—group oriented school situations with their time tables, schedules, uniform curricula, grades, examinations, and class work—the result will be *Chaos*.

What shall we do in a classroom of over fifty students when the faster ones finish their individualized sequences on a computer twenty minutes before the rest of the class?

How can the teachers' work be fitted with CAI?

Shall we allow individual students to follow their interests and to study subjects which are not in the syllabus?

Can we abolish the class, the grades, the timetable, the examinations and all the rest of it?

All of us know that there is not a single computerized teaching sequence which can't be taken off the computer and put back into work-book format, which can teach the same thing to same criteria just a bit slower.

The computer can branch but so can students. The computer can recognize correctly typed answer but so can people. The computer can store information but so can paper. All these operations of the computer can be performed by the just barely-literate adult—reasonably, accurately, and reasonably fast.

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Television as an Instructional Aid

S. Ravishankar

The objective of this chapter is threefold: (1) to explain the significance of television as an instructional aid; (2) to highlight the benefits of television with reference to the problem of teacher shortage and cost-factors; and (3) to provide an integrated understanding of the varied roles of this medium in education.

In an age of technological evolution and consequent changes in structures, it would be unreasonable to expect that the spoken and written word alone could convey the volume of relevant information in the teaching-learning process. Audio-visual aids offer a solution, as a tool available to the teacher to produce a greater impact on the learners. The teacher ought to avail the opportunity for a more varied interplay of the various responses whereby pupils pick things up, whether they be motor, visual or auditive, by offering the student a chance to see things, touch things, hear things, and so on. The result more than justifies the effort. In a formal education setting, where teaching is merely a function of passing on knowledge, the main aim is to transmit the message in a form which facilitates the student to grasp it, understand it, and store it. Audio-visual aids can contribute enormously to a communication process of this nature, by making the subject-matter more easily accessible and by increasing the retention factor. Individual study involving the acquisition of knowledge and skills is much more productive when AV aids are used. This is more so when aids like television are used.

The numerous problems that confront Indian education system have no single solution. But learning could be improved

to a great extent if the technology and techniques of the so-called second industrial revolution—the revolution of information processing and communication—could be harnessed to the benefit of the schools and colleges. What instruction requires is an arrangement of resources in a manner that the student responds and learns, reaching new plateaus from which to climb to higher levels of understanding. Implicit in such an arrangement, if it is to be effective, is the adaptability of the process to the individual student's differences—in pace, temperament, background, and style of learning. Technological aids can carry out many of the functions involved in this process:

- they can store information until it is needed or wanted.
- they can distribute it over distances to reach the student where he happens to be instead of bringing him to the teacher;
- they can present the information to the student through various senses and modes;
- they can give the student the chance to react to the material and respond in many ways.

In short, the student's opportunities for learning can be increased and enhanced by using a wide range of instructional aids. All the available resources for instruction, including the teacher, can work together to create favourable conditions for maximum effective learning. Television as an instructional medium can play a useful role in accomplishing the goals of effective teaching and systematic learning. To grasp the full significance of these possibilities, we must think of television as a useful teaching aid to take its place alongside of the others we have. We must think of it as a possible basic device around which the areas of the curriculum might be built. Sometimes, when one uses the television medium extensively, he comes to realize that such an approach to education is not as fantastic as it might appear. Television has many of the basic requirements that make such an approach possible. The physical and mechanical problems that face the classroom teacher wishing to use television are entirely different from the motion-picture.

In using a motion-picture in the classroom, a teacher has to generally proceed as follows:

1. Scrutinize a catalogue of available films or have a knowledge of such films and their contents.
2. Plan the specific day for using the film, far in advance. In some schools it may be even necessary to order films six months to a year before they are actually used.
3. Write out an order and send it through channels.
4. Arrange for a special room that can be darkened or arrange to have light control in his own room.
5. Either learn to operate a projector himself or arrange for an operator on the scheduled day.
6. Preview the film beforehand if she/he has not already seen it.
7. Dismantle the projector and return to her/his own room with the class.
8. Pack up and return the film after it has been used.

For classroom teaching television is a simple device for the teacher to operate and use. If television were to be properly adapted to the classroom, there would be viewing set in almost every classroom. The room need not be darkened and the teacher need only turn a knob or two and the set is in operation. It is infinitely more simple for the teacher to use television than aids like motion-pictures. Television can transmit an aural-visual image of almost anything. It transmits sound as does the radio. It has the qualities of sound motion-pictures, in that it adds sight and motion to sound. But television goes further; instantaneously it can bring to the audience scenes and events from a distance. Television for schools deals with history in the making, with up-to-the minute subjects in image and sound depicted and heard simultaneously by pupils. Televised broadcasts can be filmed and these and other films can be telecast repeatedly and at will. Films used in television have a definite advantage over ordinary sound films, for they can be inexpensively edited and brought up-to-date by dubbing in a new soundtrack and by supplementing with fresh footage. Television as an audio-visual aid holds many promises for

enrichment of the mode of instruction. The distinctive feature is its ability to give the audience a sense of being in two places at the same time. By means of live programmes, pupils can know the great personalities of the day in a much more intimate way. Expressions of face and eyes can be exactly noted. This sensation of immediacy and actuality causes the pupils to receive the programme with a realization that they are seeing and hearing life in the making. Much subject matter can be shifted for the average pupil from that which is abstract and dull to that which is concrete and challenging. All of these possibilities, however, imply that teachers should be prepared to use television more extensively along with other learning aids.

Significant Features of TV

In classroom instruction, television as an aid offers the opportunity to achieve:

- (i) More involvement and greater variety in dissemination of ideas and knowledge;
- (ii) Thorough details in research and structured programming in the communication process; and
- (iii) Increased retention of information, usually accompanied by increased motivation to learn.

Television systems are capable of carrying different kinds of symbols, including many originating through other media: speech, music, alphanumerics, sound effects, pictures, diagrams, cinematics, gestures and more. It is a "multi-medium" in itself. Television, when linked with other media like radio, telephone and high-speed print, is readily adaptable to the establishment of short interval 'closed-loop' instructional systems. These allow learning designs to be diagnostically monitored, and improving changes to be made directly contingent on actual outcomes frequently at critical points in the process. Television is not only useful for producing and distributing a wide range of effective symbols, but when used properly, it also enables us to accommodate and react to regular, coordinating feedback procedures without immobilizing delays. In fact, television can be

operated on a mass-scale; which means that it can be used to provide systematic instruction to large numbers of students and classrooms simultaneously. Further, such use can free comparable numbers of individual classroom teachers for adaptive and reinforcement tasks which are functionally prescribed by uniform presentations. Its use can lead to wholly new organizational and administrative patterns for improving the effectiveness of the total educational enterprise.

The Cost of Television

As some educational critics may argue, television is no doubt an expensive medium to use; but the cost-factor must be interpreted in a proper perspective. Education, generally, is an expensive process and if television is an effective education medium and can do certain things that other mediums cannot do, or if through the intelligent application of television we can extend good teaching to countless more pupils and enrich their educational lives, then, costs take their relative place.

Let's go a step further and ask ourselves whether or not the intelligent use of television might make it possible for us to save some of the money which we are spending on buildings or material or equipment or personnel and still not endanger the intellectual and personal growth of our youth. Television is an entirely new type of medium. It may require a completely new approach as an educational process. It may demand a drastic reappraisal of our traditional plan; of course, organization and teacher scheduling too.

The cost of television may actually be only a temporary barrier. It is inevitable that the price of television equipment will decline as mass methods of production are applied in this industry. If the schools and colleges in India were to develop a demand for transmission equipment so that it could be quantitatively produced on a large scale, then the unit cost would be reduced materially.

The Problem of Teacher Shortage

Let us now examine the implications of the growing problem of teacher shortage in the country. An increasing number of youngsters in Indian schools are in classrooms

where the teaching is far below the minimum professional standards. Many thousands of others are in classes that are oversized. This rising tide of neglected youngsters combined with the persistently increasing educational costs, is going to bring great pressure from all sides for some kind of action in the years to come.

If we consider the extensive potential of the television medium against the growing crisis in the Indian schools, it seems quite obvious that educators generally must explore the educational potentials of this amazing new medium. If limited experiments show that through television the influences of outstanding teachers can be extended into classrooms where there is mediocre or downright poor teaching, then, it will be difficult for educators to resist the application of this new medium in the classroom. Educators must face the inevitable fact that as the problem of classroom and teacher shortage grows in intensity, there will be increased pressure to try new methods and adapt new procedures. If television is as effective as it seems to be, then, we cannot expect the educators to accept continuous postponement of its use in basic educational horizons.

Instead of resisting the possibilities of this new medium, the educational profession should come forward with foresight to develop resources for adequate experimentation. There are, today, industrial organizations with great resources at their disposal that wish to demonstrate the educational use of TV in meeting the teacher shortage. But, more than demonstration, careful and controlled experimentation by competent educators is required. Basic educational values have to be sustained at any cost. It is the responsibility of the educational profession to take the lead in appraising this medium and adapting it to the needs of young learners. If there are pitfalls, we should know them; if there are potentials, we should develop them; and if there are vested interests that resist desirable change, we should reason with them.

A Look at the Future

In popularising the use of television in schools and colleges, much effort is required. It is encouraging that

recent years, attempts to promote instructional technology have started gaining greater momentum. The launching of Indian Satellites and the benefits derived from them demonstrate the possibility of achieving a breakthrough in the field of science, technology, and education. In training teachers at various stages of education, namely, at primary, secondary, and college levels in operational aspects of technological teaching aids and in developing a favourable attitude among them towards the benefits that instructional technology can offer, institutions like the NCERT, SCERT, Centres for Educational Technology, and teacher-training institutions etc., can play a useful role in the years to come.

To sum up, television as an instructional aid, has the potentiality of facilitating better communication and retention in the teaching-learning process. Perhaps the potentiality of television is the greatest unifying force ever to act upon man; but to attain optimum potentiality we must try to find a way to unfetter it, a way to let it operate freely in all the educational institutions in the country.

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Systems Approach to Educational Technology

Motilal Sharma

There are two different views about the concept of educational technology. According to one school of thought, educational technology means the media born of the communication revolution which can be used for instructional purposes, alone, or in combination, with the teacher, textbook, and blackboard. These media may include radio, television, films, overhead projectors, programmed instruction, computers, and other items of *hardware* and *software*. According to another school of thought, educational technology goes beyond any particular machine, medium or device. In this sense, educational technology means a systematic way of designing, implementing and evaluating the total system of learning and teaching in terms of specific objectives, based on research in human learning and communication and employing a combination of human and non-human media to make the instructional system optimally effective. Educational technology adopts the communication revolution to education, in and out of school. Educational technology, when applied properly, can make education more sensitive to the variety of ways in which people learn. It can help in adapting instruction to the individual and encourage designing of learning materials which are suited to different learning groups in terms of styles, levels and purposes.

As such, the second school of thought emphasises that educational technology could be seen as a systematic approach. And as soon as we use the word 'System', we are compelled to recognise the individual parts that go towards making up the whole system. Besides this, the inter-dependence of many system variables needs to be recognised and this, in turn, implies that what is good for one situation is

not necessarily good for another. Hence, each problem needs to be treated as an independent system.

There are three principles related to systems concept which could be utilized with reference to methodologies.

- (i) First is the principle of holism-viewing the system in its entirety in fact, conceiving of everything within the boundaries of a network of vitally linked, interrelated components.
- (ii) Then there is the system principle of *goal-directedness*. One thinks in this regard of EBO (Education by objectives) and accountability.
- (iii) The third system principle is that of *synergy*. They may have the highest pay off of all because synergy implies that impact of the total system exceeds the contributions of the individual components.

The concept of Educational Technology is based on systems concept and its application could be made optimally effective with the help of systems approach—the methodology emerged out of the concept of wholeness. Before we discuss the application of systems approach to each of the three phases of educational technology i.e., designing, implementing, evaluating learning experiences, it would be useful to discuss in brief the concept of systems approach.

Systems Approach—the Concept

Systems approach to problem-solving warrants that a piecemeal approach is replaced by an overall approach. Systems approach helps in designing complex systems by the efficient use of resources in the form of men, money, machines and materials, so that the individual sub-systems making up the total system can be designed, fitted together, checked and operated so as to achieve the goal-state in the most efficient way. Four different names, viz., “Systems Engineering”, “Systems Analysis”, “Systems Approach” and “Operational Research” are used for explaining this methodology (systems approach). Schlager (1956) says that the term “Systems Engineering” was probably first used in the Bell Telephone Laboratories in the early 1940’s. Systems engineering was

born and has been developed in two quite distinct areas in military and space technology systems during and since World War II. Systems engineering mostly limited itself to "hardware" systems. The widespread development of systems engineering has been demonstrated by Schlager (1957) and, Kline and Lifson (1968). Operations Research is said to have been born in the Battle of British which led to the, by now, legendary studies into the optimal size of convoys. Operations Research is defined by the British Operational Society as the application of the methods of science to complex problems arising in the direction and management of large systems of men, machines, materials and money in industry, business, government, and defence. The distinctive approach is to develop a scientific model of the system, incorporating measurements of factors such as chance and risk, with which to predict and compare the outcomes of alternative decisions, strategies or controls. The purpose is to help the management determine its policy and actions scientifically." Mosse (1956) says "Operations Research is related to systems engineering as physics is to mechanical and electrical engineering." Flagle, Huggins and Roy (1960) differentiate between 'systems engineering' and 'operational research' by saying that 'the operations research team is more likely to be concerned with operations in being rather than with operations in prospect,' and systems engineers are more likely to be engaged with the design of systems yet to be rather than in the operation of systems in being. Hall (1962) also supports this view. Furthermore, Jenkins (1969) says that "systems engineering is concerned with placing a big emphasis on the design of the total system and not individual sub-system."

Coming to the term "systems analysis," we find that it has been used first by RAND Corporation (Khan, H. and Mann, I., 1957) and the Systems Development Corporation (Adelson, M., 1966) to describe the application of the systems approach to the wider "non-hardware" systems. It is unfortunate perhaps that in their attempts to emphasize that systems analysis is concerned with the design of much wider systems than "engineering" or hardware systems, the users of this would have told only part of the story. This is because systems synthesis is an equally important step as systems

analysis in the design of systems. However, the term "Systems Engineering" covers the processes of both analysis and synthesis.

Operational Research, Systems Analysis and Systems Engineering have a great deal in common. Systems approach utilizes all important elements of these three and widens the scope of systems science through better communication between them. Systems approach is an interdisciplinary approach. It provides a framework within which to tie together many separate and possibly divergent distribution to the overall optimization of the problem. Thus, we can say that systems approach is a team activity and brings together specialists with such diverse backgrounds as natural sciences, engineering, mathematics, statistics economics, politics, sociology, accountancy, and behavioural science. It helps in developing a common pedagogy of communication which is essential to communicate effectively with the various specialists whose advice is essential, and to stimulate their creativity within this interdisciplinary approach. This conceptual *bridge* can help in classifying the relationship of the sub-systems that comprise the total system design. The careful observation and statement of system requirements relate to the real world at the empirical level. In order to prepare the blueprint of the system to be designed, one proceeds from the general to the specific, from a gross level of analysis to a more detailed level. The equipment and approaches that match the blueprints and personnel schedules are the point-at-able events of the real world. The experimental evaluation of the assembled system tests the designer's prediction that the components will operate together to achieve the designed effect. Again, the evaluation of this proposed system can be of three kinds: technology, operation and effectiveness. Hence to achieve better communication between the individuals, specialists constituting the system design team are needed and hence the use of the term "Systems Approach" which interprets system in "wholeness" terms.

Deardeb (1972) says that "the systems approach is nothing more or less than what a competent, smart, adequate business executive adopts in the ordinary conduct of his

business." It is, he states, merely the ancient art of management as performed by competent managers. After giving this general view and referring to many definitions of systems approach given by other scholars, he selects a representative definition given by Makridakis (1971) with which he agrees. Makridakis says that "the systems approach to management is basically a way of thinking. The organization is viewed as an integrated complex of interdependent parts which are capable of sensitive and accurate interaction among themselves and with their environment." Makridakis's definition of systems approach is more specific and wider as compared to Dearden. Systems point of view is not only to see the interconnectedness of things, which Dearden acknowledge, but also to look for process or flow, also implied by interaction. It is this "what is going on here" attitude that marks the system's way of thinking. Major characteristics of systems approach is recognition of the need to seek things. The systems approach is not unique either because it is interdisciplinary (though this is important) or because it is hierarchical (though this is necessary). It is unique because it seeks rather to place the output of a sub-system in a total system context which is based on what has been found out about the true nature of the performance of the total systems. Coming back to the question "what is going on here?" which was Mary Parker Follett's way of arriving at what she called an integrated solution. By this, she meant an answer which meets the fundamental needs of the participants without causing any compromise. Before such a solution could be found, it was necessary to find out why a particular phenomenon behaved the way it did. To determine the underlying causation, the questioning process had to include both the measurement of characteristics and their systematic analysis.

Forrester (1961) puts the whole process of systems approach in perspective by saying that we consider "the interconnections, the compatibility, the effect of one upon the other, the objectives of the whole, the relationship of the system to the users and the economic feasibility . . .," more than the parts standing in isolation or the functional components. As has already been said, sometimes, the systems approach is confused with the application of systems analysis

in the design of systems. Systems analysis is an attempt to determine appropriate behavioural laws governing system's operation. These laws can only be ascertained if the problem is studied as a whole, rather than in separate parts. Systems analysis therefore, employs a systems approach.

The chief attribute of systems approach is that it can be applied with equal effectiveness to problems of a material nature—with well defined boundaries—as to the very process of delineating the boundaries of a dilemma so that it can be focused sharply into a problem and then be solved. It does imply that the systems approach is not only successful in problem solving but also in locating actuarial boundaries of a problem and its environment. Systems approach can be defined as "an orderly way of appraising a human need of a complex nature, in a "let's stand back and look at this situation from all its angles," frame of mind, asking oneself questions on the following lines:

1. How many distinguishable elements are there to this problem?
2. What cause-and effect relationships exist among these elements?
3. What functions need to be performed in each case?
4. What trade-off may be required among resources, once they are defined?

Thus, it could be said that the systems approach is a way of studying changes in complex situations in a selective way, parts of the situations are regarded as systems and are separately studied in relation to their working context.

Application of Systems Approach

The application of systems approach early in the conceptual phase helps to reduce the chances of oversight, or the occurrence of so called 'appraisal gaps.' And this is achieved by using a structured technique to continuously identify and assess the impact of changing objectives, constraints, and design criteria on required resources and available resources: technologies, personnel and facilities. To make this point clearer and highlight the need of a systems approach, let us

take an example. Let us suppose—a head of a school is given a form to fill up “which measures the kind of management system he is using.” If his answers to some of the points show that his school uses a system ‘X’ organization, then it can be assumed that the answers to the rest of the items will generally display a system ‘X’ pattern. To find out consistency of answer on different items, we can calculate personian co-efficient of correlation. High positive correlation will show a high order of consistency between items in terms of perception of the headmaster, whereas high negative co-efficient of correlation will indicate the lowest intensity of association (no relationship) between pattern of answers to different items. Now what is the importance of such statistics for systems approach? We know that an estimate of the amount of variance in one item which is associated with that in the other can be computed by squaring the co-efficient. Thus, a coefficient of correlation of $+0.60$ would indicate that the variance in one item accounts for 36 per cent of the variance in the other. Thus, correlation represents a degree of interdependence. Now the job of the system specialist is of locating the factors responsible for high or low relationship and accordingly look into the change he wants to suggest. Secondly, ‘systems approach can help in building internal consistency, i.e., every component of particular system fits well with each of the other parts and functions in harmony with them. The same is true of the decision-making processes and the compensation plans. It will help in building compatibility of goal-states of subsystems of the total system.

The implication of this for system specialist is that changes in a system must be internally consistent. The traditional atomistic research design is not appropriate for experiments involving organizational theory or management systems. Every aspect of a system is related to its every other part and interacts with it. The results obtained by altering a single variable while keeping all others constant, the same usually will yield quite different results from those obtained when that variable is changed along with simultaneous and compatible changes in all other aspects of the system. The true influence of altering one aspect of a system cannot be determined by varying it. Thus, first it permits logical

understanding of the way in which variables change and a way of looking at the range of variation which variables may show within the system. This provides further understanding of the relationship of a set of subsystems to the goal of a supra-system. A set of variables with the characteristics of step, part and full-functions makes it possible to conceptualise a set of subsystems which have incompatible goals and which may appear contrary to the goal-state of the supra-system. In such instances, the variables in a given subsystem may remain in a period of constancy. The supra-system made up of independent and dependent sub-systems, some of which have incompatible goals, will be in a continuous process of adaptation resulting in system persistence upto the point that the stimulus is so disruptive that some subsystem variable(s) is pushed beyond the range of variation the subsystem (or the supra-system) can tolerate. The supra-system in its real state and with a set of sub-systems, all in their goal-state, is a system in perfect equilibrium. Hence, while dealing with systems, a systems approach must be used. The organic integrity of each system must be maintained while experimental variations are being made.

The systems approach is *deductive/inductive* in nature. The thinking path provided by this approach is in the form of closed loop that has distinct stages for timely inputs and continuous feedback. As such, thinking evolves in cyclic fashion, as it progresses from general objectives to plans (deductive process) then back to refining objectives and to detailing plans further. Three major points which should be taken into consideration while preparing for application of systems approach are:

1. Start with determining the boundaries of the overall system and its supra-system (environment if any).
2. Define the system at hand (may be an organization or a problem) in its minor details.
3. Don't pre-judge solution. Any solution in mind should serve as guide, rather than point of departure, in the planning process.

An Overview of Components of Systems Approach,

There are three major components in systems approach.

1. *Systems Analysis*: At this stage, needs of the systems, resources available, and the constraints present, are analysed in minor details and on the basis of this analysis, boundaries of objectives are defined, i.e., the problem is stated in terms of objectives. If briefly summarised, this stage involves two steps. The first step is that the systems specialist states or is given objectives, and he determines what ends are to be achieved. So, at this stage, systems analyst answers two questions simultaneously, i.e., "What is?" and "What is required?", and thus specifies the problem, i.e., discrepancy between 'what is' and 'what is required.' In other words, at this stage he specifies the problem (system) and environment (context) and translates 'needs' into objectives keeping in mind the absolute environmental constraints and relative constraints. At the second step, the systems specialist analyses the "tremendously complex" network of interactions in the relevant system in context with the environment and its influences on the system. Thus, he specifies the requirements of each objective. At the same time he attempts to collect data regarding alternative approaches or generates alternative approaches to meet these requirements. Thus he performs a systems analysis. At this stage the system specialist describes the system (problem) and its environments; discusses interactions in the system and between the system and its environment, describes current structures, functions, and roles, identifies constraints (both absolute and relative), and outlines alternative courses of action. Fig. 1 presents the two steps described above.

2. *Design of a Solution (Synthesis)*: At the synthesis level, the context of the problem is further specified, selection criteria for selection of approaches from among the available are developed and techniques, methodologies and approaches are selected. Then, if it is a problem related to teaching or training instructional tactics based on models like Gilbert's, Gagne's, Bloom's etc., are decided; if the problem is related to execution and administration, managerial tactics are defined and so on. Having done this, the total system, utilizing the

selected variables, is structured and designed for tryout and validation.

In fact, at this stage the system specialist's first task is selection of approaches to reach the specified goals (objectives), i.e., minimization or elimination of discrepancy between "what is" and "what is required" discussed at the first stage. For this purpose, he specifies a certain criterion, performs the 'approach versus criteria' analysis and thus conduct 'trade-off' process for selection of appropriate method/approach to meet the requirements of each objective. Now the system specialist is equipped with the specified objectives, the requirements of these objectives, and the approaches needed for achieving each objective. On the basis of these elements, he prepares an integrated action plan or designs the system in terms of inputs, process (procedures and transaction within the system, including decision and control mechanisms, i.e., 'feedback') and output.

3. *Putting the Stage I and II Together:* Objectives which emerge out of needs of the total system are used as departure points in systems approach. Then, each objective is analyzed in successive stages, into detailed requirements and approaches, additional new data are introduced (inductive process) to support the analysis. To decide which approach and solution is to be selected, selection criteria are determined, compatible with the original objectives, and are applied, to choose the approaches. Then, the selections are synthesised (inductive process) into an advanced development plan or system design is designed for try-out and formative evaluation. Fig. 1 presents the first two stages of systems approach.

Obviously the translation, or initial formulation of the problem is an important step since it sets the course of all the work that will follow. Translation includes the interpretation of objectives and all recognized constraints on the problem solution. At this step in the cycle, the selection criteria are also determined. These criteria are later used in the trade-off study. Some categories of constraints, such as timing and policy, are also used as selection criteria. The difference between these two uses is that constraints are generally applied as absolute limitations, whereas selection criteria are applied later in the cycle to determine the relative merits

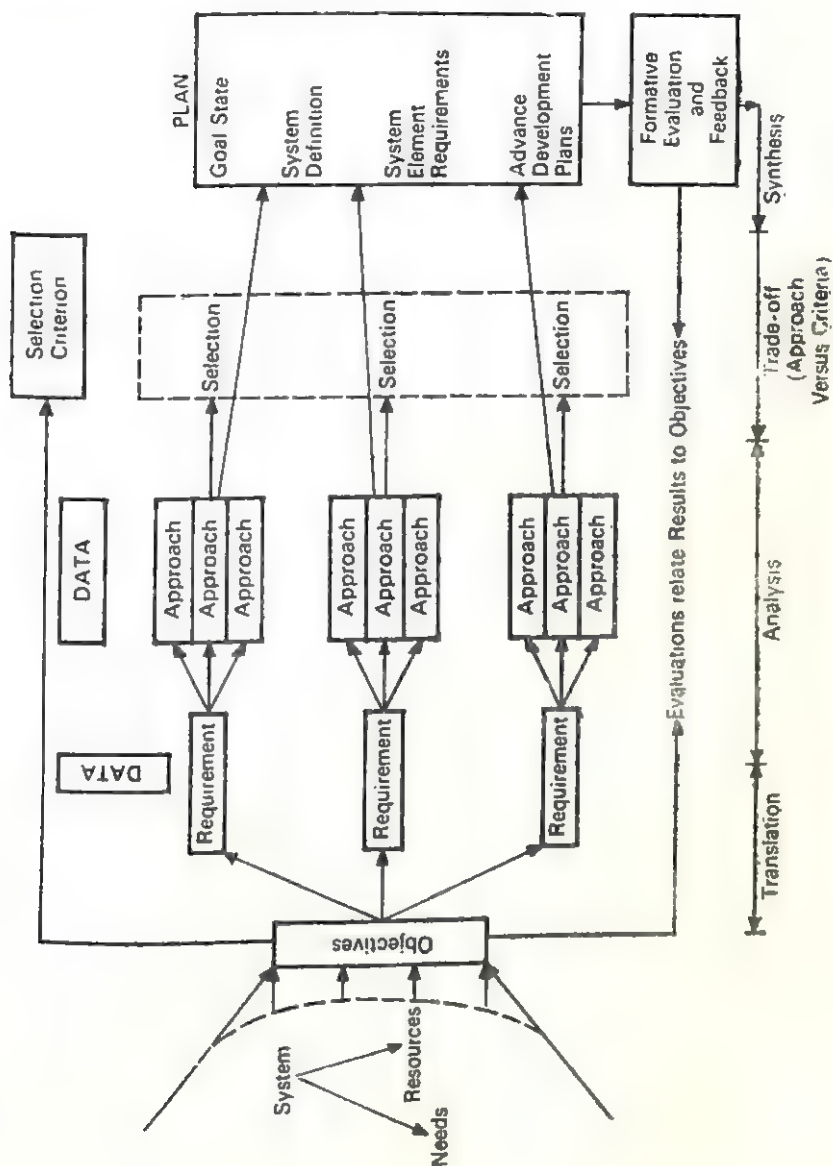


Fig. 1. Systems Analysis and Synthesis

of possible approaches. During the cycle, a number of feedbacks may be required, as shown in the Fig. 1 to improve and re-evaluate the output and thus establish the internal validity of the system.

Implementation and Evaluation

To determine the validity of outcomes of this system, the same is implemented on a sample or in a simulated situation and the alternatives which provide the best solution at maximum efficiency and minimum cost are determined. Now the characteristics of the output or product are examined to determine the extent to which the outcome meets the criteria identified and satisfies the objectives. Evaluation at this stage known as formative evaluation. If discrepancy is still present, then "objectives" and "approaches" are further examined and modification or re-design is carried out to meet the requirements which is characteristic of a self-correcting or closedloop solving model. Thus, system synthesis is carried out and system is designed for large-scale implementation in real situations. The detailed steps of these stages have been presented in a schematic flow chart given in Fig. 2.

The modified system is put to large-scale try-out (field try-out) which is followed by summative evaluation. It evaluates the actual efficiency of the system and contribution potential of the same for solution of the problem at hand. These data are further used for making decisions regarding 'change' if desired for 'confirmation' of the effectiveness of the system to achieve the goal state.

At this stage, it should be useful to note that the shapes of symbols used in the flow chart also convey meanings to system specialists. In the flow chart cited above, rectangles and squares indicate a processing function (a dynamic activity) within one of the subsystems. The diamond refers to a point in time which warrants decision making with regard to a particular step made within the system in order to proceed to the next set of steps or be recycled to prior step. Then there is a six-sided symbol in flow chart which refers to *predefine the procedure* that occurs within regularity of the sub-system functions. Banghart (1969) has discussed and given a set of standard flowchart symbols.

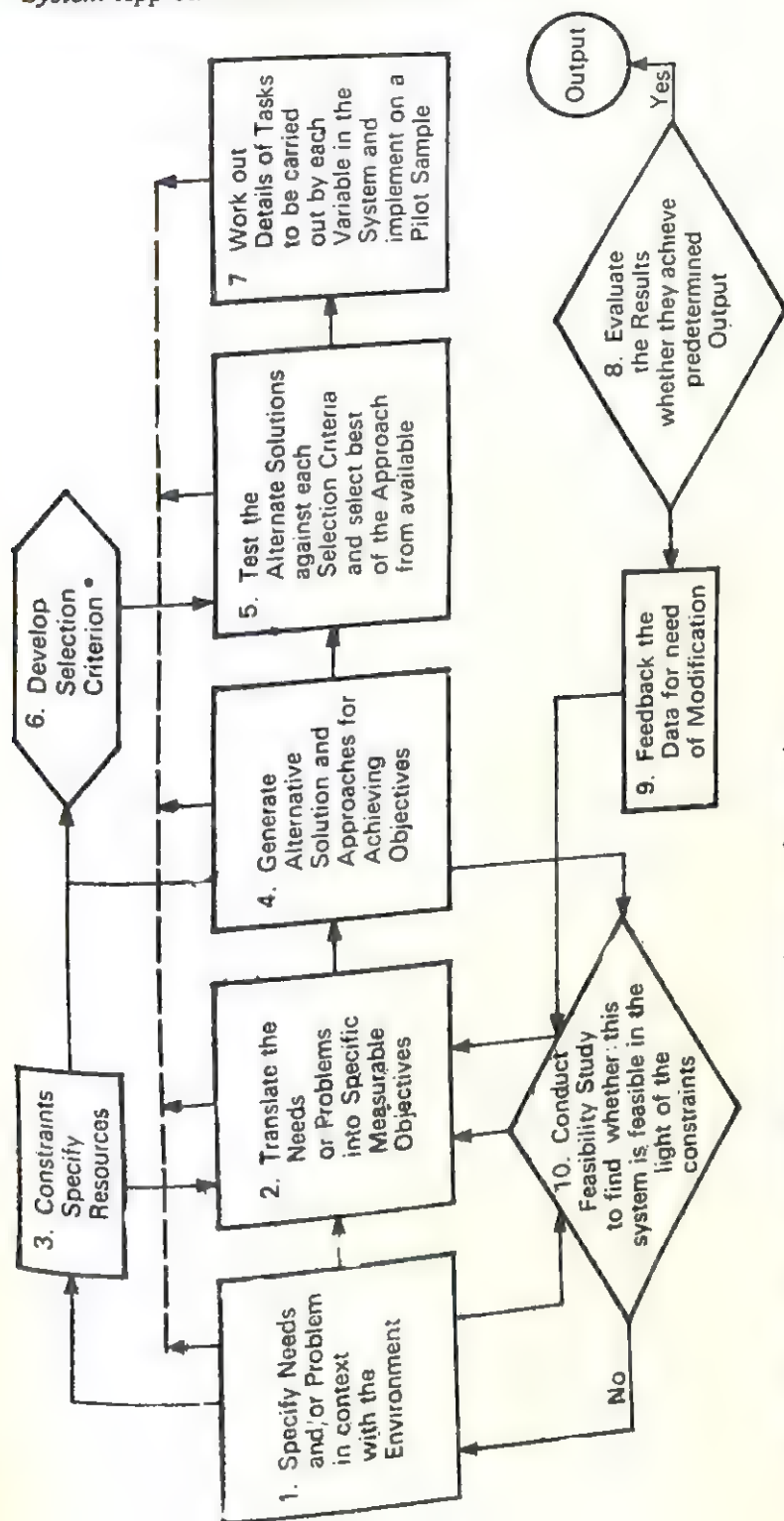


Fig. II. Flow Chart of Steps Involved in Systems Approach
(Dotted lines show Feedback in the Formation Stage among Sub-system)

Systems Approach to Educational Technology

As it has already been discussed, educational technology is "Systematic approach to designing, implementing and evaluating learning systems." This clearly implies that effective application of educational technology to learning system warrants use of systems approach by educational technologists. Designing of learning system involves: (i) Development of objectives; (ii) Consideration of learning sequences and strategies, and (iii) Consideration of appropriate modes and media.

As the objectives serve as base for development of criteria with which to judge the effectiveness of the learning system, the major problem of educational technologist is to identify and define the objectives of the learning system in the development of which he is engaged. At this stage, systems approach could provide guidelines to him. The systems specialist will ask two questions to himself: (i) where do objectives come from?; and (ii) how do they arise? Answers are simple: (i) they come from the views we all hold about the future needs of people in society and about the skills and insights that have found expression in the various arts, crafts and sciences, and relate such views to the here—and now needs and interests of individual students, and (ii) they arise in the perceptions of teachers, students, parents, employers and all who have a stake in education. Systems specialist will do systems analysis at this stage and prepare an inventory of objectives in a logical sequences and will put them in order of priority. He will classify them in terms of: (i) life skill objectives; (ii) methodological objectives; and (iii) content objectives. 'What is worth learning?' and 'What is not?' are very largely determined by our beliefs or assumptions about the future roles of people in society. 'Trade-off' exercise could be helpful at this stage. This warrants a systems specialist to keep a keen eye for priorities among objectives and how they relate to overall aims, recognising that many different methodological objectives can equally well support the most valued life skills and that those methodological skills can equally well be exercised in attaining any of an endless variety of content objectives. Only when we have decided about objectives can we realistically set about designing appropriate and relevant

learning experiences. In the end, we can say that once student's learning objectives are finalised, the systems specialist has defined the problem in terms of specific objectives which is essential for designing an effective learning system.

The analysis phase is followed by the second step which is known as '*design phase*.' Under this phase, the systems analyst makes an attempt to design the learning experience. At this stage, two things are considered simultaneously: (i) sequences and strategies of learning; and (ii) modes and media of learning. To do this, the educational technology utilizes systems approach to the design of learning experiences. A given strategy or medium is not equally suitable for all objectives. Different ends demand different means. The task is to choose from all available strategies and media those which are most likely to bring about each specific behaviour desired. Systems approach would suggest *end-means analysis* to achieve this objective. Before we can make firm decisions about the strategies and media that will carry the student to his objectives, we need to have some idea of the routes he may take. When planning the course as a whole we may identify many types of sequences. There could be chronological sequence, caused sequence, or structural logic or the subject matter might dictate a sequence. Some units may be problem centred. That is, problems suggested to the students or arising out of their experience, may be used to generate the sequence of ideas. The planning of curriculum might also warrant considerations related to logical and psychological order.

Decisions on stimulus modes and presentation media are, in fact, intertwined with those on sequences and strategies. Sometimes, plans will be finalized first in one area, sometimes in another; but the decisions interact and help limit one another. By mode, I mean the kind of stimulus presented to the student. Thus, written symbols represent one mode, pictures another. The vehicle carrying this stimulus mode is the medium. There will be a variety of media available for presenting any given stimulus mode, i.e., books, posters, films and so on. [When we transmit a message using a mode that requires a tangible medium of presentation (e.g. film) the result is a piece of software (e.g.), a piece of film

containing a written message]. A learning resource is any combination of stimulus mode and presentation medium with a message for some student. Educational technologist uses systems approach to find out appropriate media for presentation of a given stimulus mode. Decisions regarding learning sequences and methods, and, mode and media help in designing the learning experience. Thus, the systems specialist completes his second step of systems approach (i.e., synthesis) thus making an attempt to achieve the objective of implementation of E.T. in optimally effective fashion. Educational technology, thus, utilizes systems approach and with the help of systems analysis and trade-off step identifies the optionally effective methods, media, appropriate subject matter sequences and thus designs optimal learning experiences. Thus the educational technologist does synthesis.

In order to ensure the efficacy of the system (learning experience designed) the Educational Technologist puts the systems to try-out as defined by systems approach. At this stage the evaluation done is known as formative evaluation. The purpose of formative evaluation (micro-evaluation) is improving the instructional systems to optimize their efficacy. The learning experience thus tried out are implemented at large scale.

Thus, the educational technologist has utilized systems approach and worked through the first two phases of educational technology, i.e. (i) dealing with objectives and the design of the learning experience, and (ii) implementing the learning experience. While he did so, the shadow of the two final phases—evaluation and improvement rose and has been rising to meet him. This phase also warranted for application of systems approach. Now the problem was to evaluate the results of encounter of students with the learning experience. Evaluation is nothing but the means whereby information is systematically collected and analysed about the results of a student's encounter with learning experience. The insights gained from evaluation might help the system designer in improving its efficacy not just for the present students but for future students also. Micro-evaluation (*formative evaluation*) should go on unceasingly as part of the teaching process. In addition to it macro-evaluation (*summative evaluation*) of

learning experiences and systems as a whole,—deciding the effectiveness of system for different students is also needed. Perhaps, the most crucial distinction between the two types of evaluations is that micro-evaluation, although it may well feed data into the macro-evaluation, has the primary purpose of improving the system '*in making*,' thus, making ongoing teaching effective for the present students; while macro-evaluation, on the other hand, chiefly aims to benefit students in some future learning situation from an improved version of the present system. In other words, macro-evaluation leads to insights into the overall effectiveness of the system (*learning experience*).

In order to get reliable results from evaluation we need an effective evaluation system and systems approach can help us in this endeavour. The systems specialist, in order to achieve this objective, would first develop an inventory of all the possible purposes of evaluation. These purposes could be classified into four or five different groups. Having done this the systems specialist will develop an inventory of all types of evaluation and evaluative tools: tests, examinations, assignments, continuous assessment, projects, seminars, structured interviews, performance tests, demonstrations, etc. The types of evaluation will be considered in the light of the requirements of purposes of evaluation and the evaluation system designer will select appropriate types of evaluation and design the evaluation system. While doing so, the systems designer will continuously ask himself three questions: 'evaluation of what,' 'by whom,' and 'for whom?' The evaluation system designed so is tried out on a small group. On the basis of the results of try-out, if required, the system is modified and the final form of the system is used for evaluation purpose. Thus the last phase of educational technology is completed.

Finally, it could be said that systems approach helps in optimizing effectiveness of use of educational technology. It helps in all the three phases, i.e., designing, implementing and evaluating phases of educational technology. Thus systems approach could be fruitfully used in applications of educational technology.

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Systems Approach to Curriculum Improvement

Malla Reddy Mamidi & S. Ravishankar

The objective of this paper is four-fold: (1) to explain the systems concept with reference to its historical antecedents; (2) to discuss curriculum as a system; (3) to highlight some of the characteristics of systems approach; and (4) to emphasise the importance of systems approach to curriculum improvement.

In recent years, much talk has been going on among educators on the need for reform in curriculum, in grouping students, in scheduling learning activities, in individualizing and equalizing educational opportunities, in utilizing teaching methods and media, and so forth. However, efforts for improvement have been sporadic and unrelated to overall learning objectives, and based on whim rather than a systematic evaluation of alternatives. And too often, efforts for improvement of curriculum have been attempted only to cause ill effects and the results of testing and evaluation have not been used systematically to improve system performance.

Most educational institutions have been trying to find an answer to the problem whether they can efficiently educate students and serve society adequately within the present administrative and organisational set up. It appears that changes in organisational structure and processes must be made if educational institutions are to capitalize fully from revolutionary proposals for curriculum improvement, and ultimately, for improvement of conditions in society. In this context, the concept of systems approach, grounded in modern organization theory, is advanced with the prospect that it can break impasses existent in educational institutions today; specially the impasse that impedes curriculum improvement.

Systems Concept Defined

Although the application of systems concept in education is a recent development, its history dates back to the beginnings of recorded history. For example, the Egyptians used a system of measurement for the construction of their pyramids. The Phoenicians devised a system of navigation that was based on the stars. In the third century, in China, principles synthesizing laws, methods, and authority were derived in an attempt to systematise management. Systems concept, as we know today, can be traced to the work of engineers, in their development of what is called 'automation'. The systems concept has evolved from engineering science, to the biological sciences, and finally to the social sciences.

Educators have defined systems concept in different ways. A.D. Hall and R.E. Fagen have offered this definition: "A system is a set of objects together with relationships between the objects and between their attributes." F.H. Allport has presented the following comprehensive definition:

.... "any recognizably delimited aggregate of dynamic elements that are in some way interconnected and interdependent and that continue to operate together according to certain laws and in such a way as to produce some characteristic total effect. A system, in other words, is something that is concerned with some kind of activity and preserves a kind of integration and unity; and a particular system can be recognized as distinct from other systems to which, however, it may be dynamically related. Systems may be complex; they may be made up of interdependent sub-systems, each of which though less autonomous than the entire aggregate, is nevertheless fairly distinguishable in operation."

According to Roy Grinker, a system is "some whole form in structure or operation, concepts or function, composed of united and integrated parts." James Miller reasons that systems may vary as to size, complexity, abstractness, or concreteness. Feyereisen, Fiorino and Nowak define a system as "a set of components organized in such a way as to constrain action toward the accomplishment of the purposes for which the system exists."

Thus, from the above points of view, a system can be conceived as a unit characterized by defined boundaries and

an array of interrelated parts, proposed to achieve stated objectives. Obviously, a system consists of input, process (throughput), output, and feedback. In the context of curriculum improvement, systems concept is to be considered as 'a process designed to redirect various elements of curriculum to ensure the accomplishment of educational objectives.'

Curriculum as a System

Generally, curriculum has been defined by many as a body of subjects or subject matters that are to be covered by the teachers and the students. This definition, which reflects a traditional concept of curriculum has a long standing, from the beginning of twentieth century. In contrast to the views of those who regard curriculum as accumulated knowledge or a process are those educators who consider curriculum to be an instructional plan. Illustrative is the definition of Hilde Taba that specifies that "a curriculum is a plan for learning." There are also those educators who view curriculum as a production system. Those who speak in terms of activity or job-analysis, behavioural objectives, and systems analysis are among those who should be included here. Job-analysis and, more popularly, activity analysis are the advocations of Franklin Bobbitt and W.W. Charters, dating back to the start of twentieth century. According to Bobbitt, life consists of the performance of specific activities; if education is preparation for life, it must prepare for these specific activities; these activities can be taught; these activities should be considered the objectives of the curriculum. Bobbitt regarded the curriculum to be the series of experiences that students should have in order to attain these objectives. On the other hand, Charters viewed the curriculum as involving "the analysis of definite operations, to which the term job-analysis is applied, as in the analysis of the operations involved in running a machine."

Systems concept, when applied to education, views curriculum as a technological process that contains many sub-processes. In this perspective, curriculum is a transmitting system that is intended to convert raw material (students) into products.

It is obvious from the above paragraphs that similarities

exist between the definitions of a system and that of curriculum. The learning experiences that are mentioned in the definition of curriculum are to be viewed as comparable to the interrelated parts of the system (systems concept). Further, a systems approach to curriculum improvement implies an understanding of organization and interaction between components, integration of all activities, mutual dependence between components, and achievement of purpose.

Characteristics of Systems Approach

1. *Purpose:* The components of a system for curriculum improvement consist of the plan for providing and implementing teaching-learning situations. With a systems approach, objectives are central in decision-making activities, and pursuant planning includes a consideration of all relevant factors to the steps that are taken in the achievement of the goals. The ends of this particular system consist of the general and specific objectives that are formulated as the goals for the specific school or college population.

Systems approach emphasizes the need to relate curriculum to long-term or general goals and short-term or specific goals. For example, a currently advocated goal of curriculum planning is to develop educational programmes that help learners to become self-learners. To reflect this goal, curriculum plans would need to include curriculum designs and learning activities that extend over an entire period of schooling. Furthermore, evaluative means would need to assess growth as self-learners over an extended period of time as well as for short-term instructional activities.

2. *Organisation and Interaction:* This is a necessary characteristic of a systems concept. Organization in a system denotes "the arrangement of the components of the system into interdependent parts which function in a manner that allows the system to achieve its objectives." The components or parts, considered as a whole, constitute the organization. The components, however, must interact because, if there is no interaction, there is no organisation but simply a collection of components. When there is interaction between the components of a system, there is an exchange of information, i.e., communication or dialogue. The exchange of information

results in organisation. For example, a school consists of a number of professional personnel. If there were no communication or exchange of information among the various members of this professional staff, they would simply be a collection of individuals engaged in executing school duties. They would not, however, be an organized professional staff.

Thus, interaction is an important characteristic of systems concept.

3. *Mutual Dependence*: A mutual dependence exists between a system and the components and/or sub-systems of that system. The attainment of the objectives of the system is dependent on the processes that occur in each other component and/or sub-system. To illustrate this principle, the curriculum when regarded as a system, consists of sub-systems that can be classified as vertical or horizontal sub-systems. In a traditional curriculum, the vertical sub-system is the grade levels, and the horizontal sub-system is the courses—e.g. Mathematics, English, Science, etc. Here, each sub-system is dependent on the other sub-systems to accomplish the overall objective of the system. To illustrate, a learner's success in creative writing is dependent upon his or her ability to compose with attention to unity, coherence, and emphasis. And his or her ability to compose with unity, coherence, and emphasis is dependent upon his or her knowledge of grammar, punctuation, and spelling. The system itself, for the accomplishment of its objectives, is dependent upon all of these abilities and those attained in the other sub-systems of the system. Thus, mutual dependence is yet another important characteristic of the systems concept. ○

4. *Integration*: Integration, in a system, denotes that the components of the system are unified; they constitute a whole. In curriculum, integration is promoted if a synthesis of learning occurs. Fragmentation of learning taught in isolation defeats integration. An inter-disciplinary approach is one way by which integration should be accomplished.

The principle of integration, like all systems, principles and concepts, should be extended to all dimensions and levels of curriculum. This is to say that, not only is subject matter involved, but also curriculum design, methods, materials, and

evaluation (i.e., components of a system for curriculum improvement).

Thus, the system, approach to curriculum improvement, involves all the steps or processes. To sum up, education system in our country is undergoing gradual changes and curriculum reform is carried out in tune with changing social needs. In this process, an important task of educational policy makers is to ensure understanding of various sub-systems or components within curriculum framework before attempting overall curriculum changes. Systems approach to curriculum has far reaching implications in education. It provides guidelines for effecting changes with emphasis on integration, organisation and interaction, mutual dependence, and purpose (objectives) principles. Systems approach is a technological process, which has the potentiality of providing an integrated framework for curriculum improvement in terms of overall educational objectives.

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Planning and Implementing Non-Formal Education: A Systems Model

Motilal Sharma

The first requirement of a system-specialist for planning, for reordering of the existing system or planning a new system is the detailed information about the system that exists. Many different types of data are needed. The quality and objectivity of the data collected and the form in which they are presented to decision-makers will deeply influence the systematic planning. Appropriate and adequate data make possible continuing reformation of sensible objectives and clear deliberation on the best means of achieving them. In the case of planning a non-formal education system, the following basic data are needed:

1. enrolment figures for all levels of education;
2. percentage of drop-outs and repeaters at all levels;
3. percentage of school-age population not receiving any education;
4. number of qualified teachers available in the community;
5. number of educated persons and skill specialists available in the community;
6. professional training facilities available;
7. inventory of school buildings and buildings that could be used for educational purpose in the community, instructional materials, equipments, estimation of utilisation rate;
8. budgets available and budgetary constraints;
9. adult literacy figures and information about each illiterate;

10. adult (or continuing) education facilities and estimated participation,
11. vocational training statistics; and
12. shortage of skilled manpower in the economy.

Besides the above, the statistics, if they are to be useful in planning, must include enough information on the past and the future (projections for five to ten years ahead) to reflect population trends, village to city mobility, and changing economic and social requirements. Comprehensive data collection tends to highlight all kinds of things that had been previously overlooked. Attempt may also be made at identifying the results of the educational system.

Resources, their allocation and use are crucial to educational system planning. When planning a new educational system, one has to be sure of adequate resources. These resources could be categorised as: (1) money; (2) programmed materials; (3) manpower; and (4) equipment/buildings. All are essential in the right amounts of the right quality for the right period of time ahead, if a new system is to succeed. It demands programme budgeting, which relates expenditure directly to objectives, and which groups manpower, equipment and buildings into functional programmes.

Development of the model, reported here, was preceded by a village survey based on door-to-door, survey. After completing the evaluative survey of the village, a few committees were formed to design different components of the systems model. These committees emerged out of dialogues and discussions at different levels. The main committees included; (1) project committee; (2) village development committee; (3) mahila mandal; (4) old citizens group; (5) bhajan mandal; (6) education committee; (7) farmer's club; and (8) youth club. The project committee held a series of meetings, aimed at stimulating participation on the part of local leaders and enlightened persons in the programme. Village development committee was the major committee of all the sector committees which included representatives from all walks of life. The project committee worked as expertise *think tank* and concentrated on getting maximum out of the local educative potential. To initiate the model development

exercise, the systems models for planning non-formal education developed by (Sharma, 1977) was adopted which was discussed in greater detail at committee meetings. In all the meetings, the project committee members used to be always there to provide guidance and information and each meeting was followed by group-work. These groups were designated as '*dialogue groups*'. Each dialogue group included members from the project committee and representatives from relevant sub-committees. In all the cases, village development committee was represented at such meetings.

The initial planning model had 97 sub-systems of nine major sub-systems. Debugging took place by discussions and narrations; and the resultant model which constitutes nine major subsystems is discussed in the following paragraphs. Flowcharts of these nine subsystems have been reported in Sharma (1981). In this chapter, only the flowchart of an integrated model is reported.

DEVELOPING A MODEL FOR PLANNING NON-FORMAL EDUCATION

1. Developing NFE Programme

This is the first of the nine sub-systems where planning begins. It is supportive to the other systems as a base point of administration, policy and regulatory procedures. As the planner cycles through the model, this sub-system becomes more explicit. The more the planner 'cycles' through the model the more specific and predictive he will become. This sub-system identifies national, state and district plan sub-system which is offered at this point to enable planners to determine national, state and district procedures. Guidelines are prepared and published. Guidelines given at national, state and district level are stored because the local plan cannot be contrary to these guidelines. After completing the work of guideline preparation, the tool for door-to-door survey should be developed in which all the questions are included which cover the demographic information, village development needs, and family needs of the villagers. Thus, information collected by door-to-door survey should be made baseline data to develop a village plan.

Local planner's first self-directed activity results into development of local plan sub-system. The first event in the sequence should be that the local director with the consultation of project team must develop *Planning Team Approach* taking representatives from all major groups and develop the planning-model in a narrative form. This narrative model is reviewed by an advisory group and project team, and then, included in the master plan. Any information from further effort or recycling of the model is stored for future use by local, district, state or national official.

In review, in the light of the guidelines, the careful compilation of all local plans and the coordination of all these plans into a district-wise master-plan is suggested. Such a plan could be a feedback to the local level and this closed submission review-cycle permits maximum communication and development of realistic planning-goals.

Local planners should take care in defining the roles and tasks of the planning team. In developing *Planning Team Approach*, careful selection of people will help the total planning as well as follow-up. The group initiated discussion with eighteen sub-systems of this system and finally accepted seven to design this system. The few points which may cause breakdown of planning continuum which emerged during discussions could be as follows:

- First, when explicit directions are not provided to planners.
- Second, a clear delineation of planning task is not made.
- Third, a review pattern is not developed.

Fourth, there is a time lag in communication. Besides this, when there is no adequate staff and the coordinator is necessarily part-time, such a course of action leads to an incomplete and inadequate planning.

2. Quantify Operating Parameters

A complete and accurate information in this subsystem is essential. This subsystem may have to be recycled several times before the planner is convinced that he has adequate information. Basically, the task in this subsystem is to acquire quantifiable data for the purpose of making supportable and

justifiable decisions. Lack of such data may cause inaccurate, inefficient and ineffective decisions and thereby crippling the whole plan. This subsystem enables budgeting justification.

First of all, *Identify Learner Population* (subsystem) is designed to indicate the need for determining potential learners or target populations. All potential learners are identified through the use of census, previous enrolments, the data acquired from other local sources, door-to-door survey, door-to-door contact, etc. After the learner population has been reported, the budget can be computed through the appropriate funding formula and scored. Budget adjustment with local levels need to be identified here. Adjustments will consider such things as local donations, use of volunteer help, outside resources including manpower and district/state funds. For example, class cost may be reduced by availability of free teacher; cost of materials may be reduced by free materials from some organization or obtaining teaching aids on loan from local schools.

Much to the success of a local programme can be predicted on the basis of inventory of resources. Cost-free location, local talents, and community resources may allow to extend programme budget. At this stage, every effort must be made to identify personnel, fiscal, and physical resources, such as free space, business and industry resources, religious, social and civic groups, and governmental agencies that may have an input in the programme. This should be followed by identification of staff requirements by the planner. Now the planner is ready for evaluation and modification of parameters of the plan, which is subject to examination of data acquired in the total subsystem. Any decision made here not only affects the budget, but all the subsystems. Besides this, to summarise the discussion of the second subsystem, (*Quantify Operating Parameter Subsystem*) every possible effort must be made to get information that can be quantified by numbers, money, time and the like. In this case, the group started discussing seven subsystems of this system and finally accepted all the components to formulate this system.

3. Identifying Programme Needs

This system warrants that planner should accurately

discover the various needs which will determine viability of the system. An important filter of needs is the programme parameters identified in the second sub-system. There may be a need for a course in car driving, but if there is a small number of teachers (motor driving) and a non-formal education policy prohibiting this activity, then, satisfying such a need is not realistic. Need identification requires a survey of the universe of the participants.

Teachers are most likely to be able to reflect the needs of learners because of their training and contact with students. *Students* would be able to tell about their immediate needs and needs of their fellow citizens in the community. *Community representatives* would be able to give their assessment towards total needs of the community. All of the needs identified in these three subsystems are analysed for preparing a detailed need-inventory. Following the preparation of inventory, the planner is required to select and rank the needs which the programme will seek to alleviate.

Under the step *formulate programme objectives*, the planner is required to establish direction to his programme in terms of objectives. Hence, he prepares management objectives and translates needs into educational objectives. These objectives are also used to direct the activities of other subsystems and serve as evaluation standards. Under the step *select sample group*, the planner should select a group of clients representative of the population he will serve. He has to be sure to get a proportionate cross-section of the population by using learners with varying cultural, religious, social and economic background.

The needs-inventory may be prepared with the help of written oral questionnaires. Then, all the identified selected needs may be ranked in terms of high to low priorities. A high NFE priority need would be literacy classes. While a low priority item would be music appreciation class. In the beginning, the group began with the original six subsystems and finally accepted all the six components which constituted the original subsystem.

MBO (Management By Objectives) approach can be employed fruitfully and effectively to formulate programme objectives. In any case, the planner needs to establish

objectives that can be communicated to his staff or co-workers.

4. Promote Programme

The sequence of functions in this system is important, for it allows sequential planning and concerted efforts. The entire *promote programme* subsystem is concerned with publicizing a programme and student recruitment. The concomitant fact of recruitment is always retention; whereas retention is dependent upon good teaching.

The programme objectives set on the basis of identified needs are fed into *Develop Educational Goals* subsystem, since they all determine the thrust of the efforts in programme promotion. This subsystem also requires the listing of goals in terms of those to be stressed. For example, information goals could be that every teacher will make door-to-door contacts every day for four consecutive weeks. Other goal could be that all campaign efforts will begin two months before classes begin to take place. *Produce information system* and *strategies* subsystem requires the planner to define tasks of each role incumbent and identify members with talent necessary to produce usable materials for all people within the programme. It is necessary for all non-formal education programme planners to make minimum use of staff in producing materials.

Contact groups may include those concerned with business, industry and agriculture, social groups, religious groups, civic groups, government agency, and educational organization/system. The object of contacting all these groups is two-fold; first, is to make the programme known, and second, is to sell the service of the programme. Perhaps, the most important of all the functions at this stage is to contact *Individuals* and communicate door-to-door. Experiences in the field strongly indicate that contacts at individual level and communicating door-to-door is the single most effective way to promote the programme, recruit new learners, and reinvolve old learners. The more effective planners have a well-organized face-to-face programme and usually acquire first time students most efficiently. Communicating door-to-door remains as the single most effective recruitment and promotional process

available to the planner. It is also the most difficult technique to employ. Another system may have teams of participants and teachers making door-to-door contact after the neighbourhood has been informed (through the other systems) of these future visits. This requires the planner to indicate the manner by which inquiries will be handled. The entire effort of the preceding subsystem was to produce resources and participants for the programme. Unless these inquiries are followed up carefully, all efforts will be fruitless. Evaluating the campaign is the last function within this entire subsystem. It requires an investigation of all promotion activities to determine the effectiveness of the efforts. Effective techniques need to be identified and stored for subsequent use. In the end, if more staff and local talents are available, it may be necessary to continuously recycle various subsystems within the entire subsystem—*promote programme*. The group started with an inventory of the original twelve subsystems which could constitute this system. The final analysis resulted in selection of the thirteen component systems.

5. Apply Enrollment Procedure

Upon his or her arrival, a student should be welcomed and interviewed. Interview of the client is conducted to determine the educational level of the student by sitting with the participant, so that appropriate materials may be shown to the learner. Teacher should also discuss with the client his personal goals. Information thus obtained during the interview may be recorded in *personal data sheet*.

The second function is to introduce the learner to the centre, when the teacher can explain the programmes and their purpose as well as the use of materials available at the centre. This entire system is organized to provide both the experienced and inexperienced teachers with a step-by-step process for enrolling a student. It is to be applied to both new and returning students. This entire system aims at making the student feel *welcome* and *wanted*, to provide guidance to the teacher in accomplishing the tasks. Group discussion, in this case, started with a list of original seven subsystems and finally all of them were accepted as constituents of this subsystem.

6. Plan and Conduct Programme

(i) *For Supervisory, Planning, and Administrative Staff:* With *plan and conduct programme* there is one subsystem which is the functional task of the planner, i.e. analyze hardware/software. For our purposes, hardware is synonymous with equipment and software with content. A teaching machine is hardware, but the programme materials used with the machine are considered as software. Software has been developed to answer the needs of the planners for a process or system, by which they could evaluate materials and hardware. Because, all too often, they are subjected to material acquisition through salesman pressure, with no method of evaluating such purchases. This subsystem has immediate value to any state level or district level agency developing a dissemination system. *Identify/obtain materials* is the first step in evaluating materials.

It is influenced to *Develop individual plan of study* in general and by *create plan in particular* subsystems. The objectives identified in third system, discussed earlier, also influence the type of hardware and software to be acquired. In identification and obtaining materials a planner may obtain samples from the publisher, examine list of approved materials issued by the state department, and can get leads from individuals at conferences and from users within the programme itself.

(ii) *For Teaching Staff:* This subsystem alongwith the items discussed above, includes the process by which a student is tested, his needs are identified, and his programme of study is developed.

Before any programme of study can be established for the learner, his/her immediate needs must be determined. If the planner or teacher feels that more items related to the non-formal education programme should be added to the inventory of needs identified above, may do so and develop a new subsystem. Following the needs identification, the teacher has to develop group-plan of study. At this stage, he may like to test the client. Data, thus obtained, may help the teacher in finding the right kind of learning materials to help the group to meet its goal. Aim of such testing should be to establish entry behaviour level of the group. The first step in

this is to enable the learner group to begin to meet its immediate needs. In order to achieve this, first, the teacher, using pre-test, selects the grade level of instruction in which the learner will be able to be successful. Next, in consultation with the learner, he identifies group learning objective. Once this has been completed, the learner and teacher select the learning-sits (location/place) which best suit the learner. This is followed by development of course outlines and instructional materials are selected, matching with the needs of the learner. Upon receipt of the learning materials, the instructional function begins. After the initial instruction, the teacher will again administer tests. The classroom teacher may develop his own tests or adapt other published tests. Then; the results obtained are analysed and the client is evaluated. In the light of this analysis, the learner either continues on with his learning programme, if he is working successfully, or the teacher cycles the learning sequence back. The teacher keeps in contact with the learner to ensure that any problems which may arise can be dealt with. Finally, test criteria is established. The testing schedule may include written test, oral test and performance test. This decision depends on the description on the part of the teacher.

Thus, it is the largest subsystem among the nine. The group started with a long list of original twenty five constituent subsystems. After discussing each of these in greater details, the group reached to the conclusion that nineteen of these components could be accepted to constitute this subsystem.

7. Recruit and Select Faculty

This subsystem comes under the rubric of staff development; hence, it was developed simultaneously with the *Train Faculty subsystem* to provide coordinators and planners of NFE programmes—a staff development process.

It is concerned with establishing selection criteria as well as describing the process by which teachers may be recruited and assigned. Recruitment and selection of faculty need to be subjected to a systematic analysis. The main task of this subsystem is identification of components of teacher paraprofessional selection criteria. The process starts with deciding about number of teachers and paraprofessionals. Under

Identify Academic Requirements, such considerations as certification, training, cognate backgrounds must be delineated and recorded. If the planner needs to waive certain academic requirements, a clear explanation of such an action needs to be recorded. The same applies to *Identify Experience Requirements*. The planner must describe the elements of experience requirements and record them. Identifying the characteristics of NFE teachers is a controversial aspect. To identify this, the present author developed a characteristic-inventory, which may be used with minor modifications. Besides, this, to meet the needs of this function, the criteria identified by a group of experienced teachers selected by their peers may be used. Once this process is over, then the applications for NFE teacher be invited. One should not confine only to former adult education teachers or school teachers. The use of school teachers as NFE teachers is subject to much criticism because of fatigue factors, availability, outside professional obligations, etc. All teacher candidates who respond to advertising efforts are screened in the light of the criteria referred to above, and are selected for interview. Following the interview, candidates are selected or rejected. The function of *Assign Faculty subsystem* is twofold in nature. Here, the coordinator may assign to some a teaching position; but he may also assign the employee a training programme. Selection criteria become evaluative criteria at the end under *Evaluate Teachers and Determine Task Performance in Particular*.

The dialogue group initiated discussion with the original ten components of the subsystem. Finally, the group accepted all the ten components constituting the entire subsystem.

8. Train Faculty

This is the second subsystem of the two subsystems devoted to establish a staff procurement and development process. It is formulated on the basis of the programme objectives and training needs which faculty requirements dictate to be met. It is predicted on the notion that any educational endeavour requires planned as well as self-renewal activities and that the best determinants of such activities are the programme needs, seminars, one day conferences, etc.

The objectives identified in third subsystem provide base

for setting training needs by indicating priorities and programme directions, and they serve as evaluation criteria. The characteristics of the faculty assigned to training will guide the trainer in establishing training patterns. At the same time, the training programme will be supportive of all activities described under '*Plan and Conduct Programme*' subsystem; hence, the trainer must examine every facet of the programme before establishing the training procedures and content.

Learning objectives are specified in such a way that an interface is established with objectives of the programme referred under third subsystem. After learning objectives are established, the trainer should determine '*Inservice Training Approaches*'. It will be the task of the trainer to identify how they shall be related to each other, how they are supportive and where and when they shall occur. Selection of Training Staff is usually dependent upon the type of training to be held. Inter-relationship between the competencies of training staff and selection of training approaches must be kept in mind. Then comes the function of conducting training programme and evaluating the programme in the light of the objectives established earlier. Learning objectives serve as evaluation criteria. The purpose of evaluation is to determine the effectiveness of the staff or training in meeting learning objectives. Results of evaluation should be stored for reference for further planning.

The dialogue group concerned with development of this subsystem initiated discussion considering the five constituent parts of this subsystem as suggested by Sharma (1977), and the group finally decided that the five subsystems are adequate to cover the content of this system.

9. Conduct Terminal Evaluation

While the model requires constant evaluation as each function is performed, a need for a final analysis exists. Not only that, this subsystem will provide input for further planning cycle, but it will also provide data for further programme justifications and for annual reports. This subsystem serves as the respository for all accumulated data needed to make a long range plan.

For '*Conduct Terminal Evaluation*', the objectives from the

preceding subsystems (third and eight) are sent to be evaluated to know the extent to which the objectives were met. '*Conduct Internal Evaluation*' is concerned with the evaluation of learners and evaluation of teachers. Each of these subsystems are composed of two subordinate systems in each case. In the case of '*Interview and Evaluate Client*' subsystem, the interview schedules of procedure are developed and stored. This subsystem fosters non-quantitative evaluation and allows to gather student's impression, suggestions, and recommendations. One of the elements of this evaluation is learner achievement because this is one of the obvious measurements of teaching effectiveness. The planners, also need to know data regarding drop-outs as another measure of teaching effectiveness. The other criteria is 'determine task performance' hence, a listing of those tasks by which the teachers will be evaluated must be developed.

Conducting external evaluation is another function of this subsystem. This subsystem requires an outside team to be developed to conduct an external evaluation and identifies the composition of such a team. The use of the model should indicate how the team is to be formed and provide the team with all of the data accumulated in the '*Conduct Internal Evaluation*' subsystem. Lastly, a '*Terminal Evaluation Form*' may be developed and applied. All of the data from the internal and external evaluation are forwarded to '*Prepare Terminal Report*' subsystem. It is suggested that the planner identifies the person or persons responsible for developing such a report from within this subsystem. Final report may be sent to district and state authorities and also to the other coordinators working at other centres.

Initially, the dialogue group was started with 17 possible constituent subsystems of this system, as suggested by the originator of the model. After discussing in full detail, the group felt that there is no need of making any change in terms of adding or deleting any component out of the 17 constituent components of this subsystem and hence the lay-out of the subsystem was adopted as it was.

SYNTHESIS

After finalising the nine subsystems, all the nine groups alongwith the coordinating group met together to synthesise these subsystems (figure 1). The groups discussed all possible inter-relationships among subsystems and reached the conclusion that at this level the relationships demonstrated by Laforest (1973) could be accepted. This final form of the model was subjected to a low level simulation, by talking through established understanding of the model by the participants. It was found that now the NFE (non-formal education) facilitators were more confident, and on the basis of data available to them about their respective community and the data provided by evaluative study they could attempt to develop tentative plans for reorganization of their respective NFE programmes. Follow-up was not possible because of time constraints and lack of funds. This model was used in planning a project known as "*Motilalvadi NFE Project*" in Surat, (Gujarat). This model has been found effective both for planning and implementation of NFE project.

A brief description of the subsystems in summary form would be useful at this stage. In figure-1, (1.0) reflects district plans and state plans, since all programmes are dependent upon these planning levels. (2.0) enables identification of planning parameters. These parameters are very important from the viewpoint of planning the local plan. (3.0) concentrates on identification of needs because NFE is need-based; hence specification of needs is essential. (4.0) aims at strengthening contacts between NFE centre and its clientele population from the very beginning. The contact programme is essential for developing NFE programmes as such (5.0) is seen as recruitment and retention of students. (6.0) could be seen as major subsystem which includes selection and evaluation of teaching materials and aids, development of individual plan of study and also establishment of evaluation criteria and preparation of testing schedule. (7.0) allows for staff and faculty recruitment and selection. It also guides in establishing para-professional selection criteria. (8.0) provides for needed training of personnel. (9.0) is concerned with terminal evaluation which includes both internal and external evaluation.

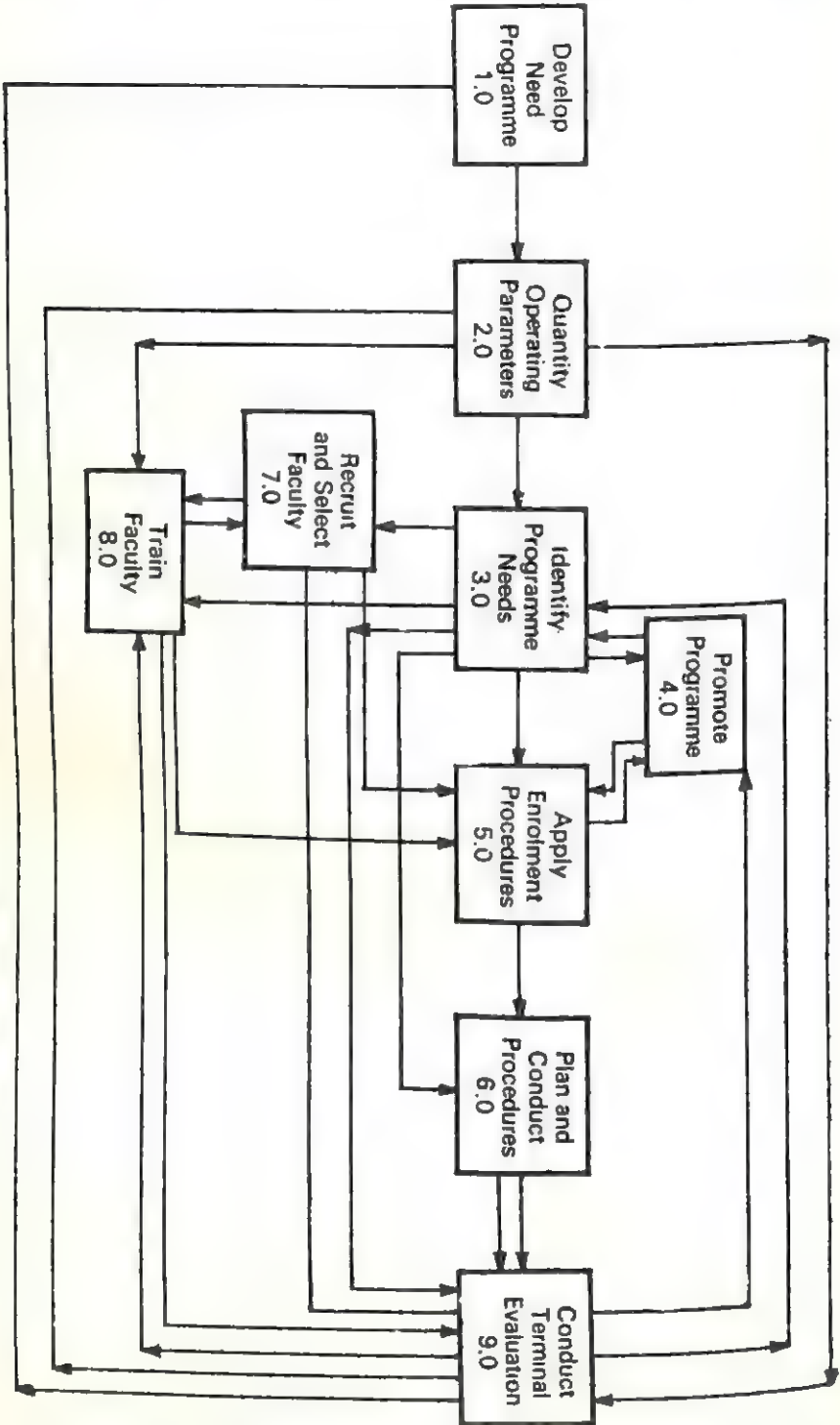


Fig. 1. Integrated Model for Planning Non-formal Education (NFE)

Thus, to sum up, initial planning model had 214 subsystems of nine major subsystems of the model. Debugging took place by discussions/narrations, and the resultant model constitutes 97 subsystems constituting the nine major subsystems. Eventually, it could also be seen that Scriven's evaluation model has been used fully even while developing this model. This model, while concentrating on planning of NFE, provides for optimal utilization of educational technology by making one aware of different aspects of educational technology, in different contexts from deciding about entering-behaviour of learners, selection of materials, aids and media upto planning terminal evaluation. The model provides for optimal utilization of educational technology in Non-formal Education.

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Evaluation of Curricular Outcomes

Jacob Tharu

Educational evaluation is a field that has seen much development in recent years. The social-political context within which the educational system functions has changed rapidly, especially in the developing countries. The number of pupils enrolled in schools has increased dramatically as 'equal opportunities' become more available to traditionally neglected levels of society. Further, the irrelevance of a colonial and elitist system to the needs and aspirations of modern societies has become evident and the search for a new and more suitable curriculum goes on. In this phase of exploration and experimentation, systematic evaluation has the vast financial and other resources that an educational system demands and virtually devours, has led to a concern for *accountability*. Merely having a large and expensive educational system or *machinery* is not enough. Society is asking for proof that the system is, in fact, producing the intended results.

Apart from the social demand for accountability, the complex nature of any modern educational system is such that evaluation is more a basic feature than an externally initiated and optional matter. An evaluation component or function is a necessary inbuilt feature of any organised activity that is goal oriented. Education is clearly one such social activity as it is directed towards certain goals. Modern education involves the concerted efforts of several types of contributors—policy makers, curriculum planners, material designers, teachers, administrators, etc. The essence of the process of learning was once meaningfully represented by the direct personal interaction between a master (*guru*) and a few

disciples. The advent of mass education has completely changed the nature of pedagogy. Today the individual teacher has a smaller though undoubtedly significant role simply because many others share the responsibility for providing instruction. Further, during the last few decades the growing field of educational technology has contributed to the complexity of the processes of teaching and learning.

Educational technology may be regarded as having two aspects. One is the visible aspect—the hardware in the form of gadgets or equipment and the related material or software. The second and more crucial aspect is the detailed organizational planning incorporating the approach (even if not all the jargon) of systems analysis. It has been said of automation that it is a way of thinking as much as a way of doing. Similarly, modernizing an educational system involves not only the purchasing of visible technology but a change in the way of thinking about the functioning of the system.

Incorporating technology effectively into the educational system involves a recognition of the importance of appropriate and smooth interaction between the large number of components or subsystems constituting the whole system. Many of these components are 'slots' for which several alternatives are possible. Extending these possibilities is one of the major functions of the mechanisms and gadgets of educational technology. But all permutations and combinations are not equally suitable or desirable. A comprehensive analysis of the total system and the structuring of combinations and sequences of components (so that the interaction is effective and optimal, instead of just happening in a haphazard way) is required in the management of education today. The availability of gadgets makes haphazard activity more likely when there is no proper plan. The availability of a slide projector may lead to irrelevant slides being screened for pupils during a particular unit. Or again, a record/tape may be played in class largely because it is available. Such inputs apart from being ineffective and worthless may, in fact, be counterproductive and hinder learning. Even if proper specifications and plans are laid down in a manual, there is no guarantee that everything will work according to the plan. With the many human interactions involved in education any

plan can only be a guide. Effectiveness in a complex system depends on the integration and coordination of the inputs (efforts where human beings are concerned) of the various components. Thus, frequent checking or monitoring to assess progress towards short-term and long-term goals is necessary. This may then lead to modified or new courses of action. This empirical process of observing and checking the working of the system may be said to constitute the broad field of evaluation in education. Many complex and sophisticated theoretical models for programme evaluation and curriculum evaluation have been developed by various workers in the field. Some of the questions that are considered in comprehensive evaluation schemes are:

How suited is the curriculum to the social environment?
Or, how desirable and appropriate are the objectives themselves? Or, how complete and up-to-date is the coverage of various new disciplines?

In this introductory essay these and other such perfectly valid questions will not be considered. We shall be concerned only with the ways of approaching the questions: "Does a given curriculum produce the outcomes it is intended to produce?" and "Are there any other 'unexpected' outcomes?".

What is Evaluation?

This chapter is concerned with the evaluation of curricular outcomes. What is to be measured are those characteristics of pupils that are considered to be the result of a curriculum to which they have been exposed. The relevant principles of measurement are thus the ones established in psychological testing theory or psychometrics. Briefly, there are three essential operations in the development of a testing procedure to measure a psychological characteristic, which is necessarily an abstraction and not a visible or tangible entity. Firstly, the particular attribute under consideration has to be described and delimited properly. In the context of learning through a curriculum especially, any attribute chosen will be closely related to other similar attributes. Learning of subject matter generally does not occur in tiny little bits. The specific

outcomes of learning we might be interested in, have to be abstracted from larger wholes. Hence the importance of specifying as clearly as possible the nature and boundaries of each particular variable. The second major operation is to collect "evidence" relating to this characteristic by systematically observing the behaviour of the individual. The items or tasks in a test are a means of collecting such data. Finally, the data or information obtained from the individual's test performance has to be weighed or assessed in relation to some already established criterion. The essence of the process of evaluation lies in this operation of weighing and arriving at qualitative conclusions—good, bad, satisfactory, complete and successful, etc. These evaluative judgements are often expressed as numerical scores. These three essential operations involved in evaluation may be regarded as the major stages in the construction and use of educational tests. We shall look at some of the specific steps constituting these broad stages later.

The term "curriculum" is a broad one; and it is interpreted in many ways. To some educators the term suggests those formally planned and organized activities that are carried at school. Some writers make a distinction between the statement of intent (namely, the syllabus, the materials, the examination scheme and the weekly time-table) on the one hand, and what actually happens as the syllabus is implemented by particular teachers and pupils. The commonly used expressions 'extra-curricular' and 'co-curricular' suggest that everything happening at school does not come under the curriculum. Fortunately for our discussion here, a neat and consistent definition of the term *curriculum* is not a prerequisite. In order to assess outcomes we need to note that the curriculum is a wide and varied set of activities and experiences, and so many types of outcomes are possible. The formally stated objectives and the syllabus will suggest the expected outcomes. The implementation of the syllabus through the interaction of teachers, learners, and materials will determine the actual outcomes. For the purposes of evaluation a listing of possible outcomes is all that is needed to begin with. From such a list a wide range of test items

can be prepared and test(s) made up of these items used as the means for measuring outcomes.

The Nature of Curricular Outcomes

What are the likely outcomes of a curriculum? As stated above, the stated objectives of the curriculum under consideration should provide the main items (a list of such outcomes). However, official syllabus documents do not, as a rule, contain clear statements of objectives. Over the last three decades or so there has been a growing awareness that in the absence of clearly specified instructional objectives neither teaching nor testing can be effective. There is extensive discussion of 'learner-based objectives', 'behavioural objectives', 'performance objectives' in texts and journals concerned with education. Among the many contributions in this field, the best known is probably the work of Bloom and his associates. They suggest that instructional objectives can be categorized into three domains: the cognitive, the affective and the psychomotor. A detailed discussion of the lists of specific objectives falling into these domains is not possible here. One important feature of operationally stated objectives is that they point to the *behaviour* on the part of the pupil that is the aim or target. It is easy to see that such specifications greatly facilitate identification of target behaviours or outcomes. When the objectives are not clearly specified there may be discrepancies between what the curriculum designer intended, what the teachers and learners do and what the tester looks for. The references on educational objectives suggested at the end of this chapter provide many excellent examples of clearly specified objectives. Most of the objectives that are given importance in the school curriculum are in the cognitive domain. Despite assertions in Commission reports and in the pronouncements of education ministers and vice-chancellors that personality development and the learning of proper moral and social values are important, intellectual learning continues to get the highest priority. From the perspective of evaluation, cognitive outcomes are much easier to observe and measure than affective ones. The principles of measurement relevant to both these areas will be surveyed very briefly in the following sections.

Measuring Outcomes in the Cognitive Domain

The intended outcomes of instruction in the cognitive domain are generally various intellectual skills related to the disciplines or subjects studied. The measurement of such outcomes is carried out through achievement or attainment tests. An achievement test is a means of measuring whether and to what extent pupils possess various abilities aimed at in a curriculum they have been exposed to. The development of ability tests to measure achievement is a whole field in itself. No detailed treatment is possible; only a brief outline of certain essential principles is included in this chapter.

The process of developing and using an achievement test may be represented as a series of stages or steps. These are not necessarily in a rigid sequential order: some of these stages have to be planned together. But it is useful to note the specific points that come up at each of the stages. The stages are:

1. Specifying clearly the abilities to be covered by the test (or subtests constituting a total test battery) in operational terms;
2. Preparing tasks using the subject matter of given disciplines that involve the use of these abilities;
3. Developing tasks into test items employing appropriate formats to measure precisely various specific abilities,
4. Producing the complete test or instrument with suitable general and specific instructions for the testee;
5. Administering the test according to a standardized procedure;
6. Assessing the responses qualitatively and arriving at an overall award (mark or grade).

Each of these stages may be regarded as an occasion for clarifying certain issues or making certain decisions. These are briefly renewed in the sections that follow.

(a) *Objectives and outcomes in the cognitive domain:* Given the requirement that instructional objectives should be learner-based it follows that such objectives must indicate the intellectual processes involved when the pupil interacts with

the content of different subjects or disciplines. The target abilities will thus be represented by activities such as identifying, recalling, defining, comparing, classifying, predicting, constructing, etc.

The scheme prepared by Bloom and his associates proposes the following hierarchical structure of mental abilities and therefore possible objectives: Knowledge—Comprehension—Application — Analysis — Synthesis — Evaluation. Another scheme for ordering cognitive processes that has been proposed mentions the following:

Identify—Name—Describe—Order—Construct. These and other such schemes provide the lists of specific abilities that a curriculum might include in its target specifications. Identifying the ability or abilities that an achievement test will measure is the first major step in its construction.

(b) *Preparing tasks and test items:* In order to test whether a pupil possesses certain abilities it is necessary to create a situation in which he engages in some activity that involves this ability. With this activity as the raw material, certain carefully designed tasks or test items are constructed. The crucial feature of a test item is that it demands of the testee a demonstration (through his behaviour) of the specific ability under consideration. Success or failure on an item thus serves as an indicator of the testee's possession or non-possession of the ability in question. The appropriateness or validity of a test is a matter of how effectively it demands the use of the specific ability it is supposed to cover. Since we are concerned with cognitive abilities here, the behaviours will generally be covert or internal processes. A distinction needs to be made between the overt or visible response of the testee and the cognitive processes ("thinking") behind it.

The objectives of instruction in the cognitive domain are concerned mainly with the intellectual processes involved when the pupil interacts with the content of different subjects or disciplines. The target abilities are generally related to activities such as identifying, recalling, defining, comparing, classifying, predicting, etc., when appropriate content for such operations is indicated. Specifying clearly what these specific target abilities is the first step in the evaluation procedure.

This issue has already been referred to in the discussion on objectives.

Given a specification (or specifications) of what to look for in the pupils, the process of gathering data can be taken up. This phase involves preparing and administering suitable achievement tests to the pupils. The construction of achievement tests is a whole field in itself. Even a modestly detailed treatment is not possible here. Only a brief outline of the essential principles is included.

An achievement test is a means of measuring whether and to what extent pupils possess various abilities and skills aimed at in a curriculum they have been exposed to. The items comprising a test are designed to present tasks or problems to the testee. The crucial feature of a test item is that it demands of the testee that he demonstrates the ability or skill the item is based on.

(c) *Testing techniques commonly used:* Tests may be placed into one of three categories according to the type of task they are made up of. Paper and pencil tests constitute the first category. There is generally a printed or typed question-booklet and the testee writes his responses on the question-booklet itself or on a separate answer book. The term 'write' here also includes ticking, encircling, underlining, etc. In a second category of tests the testee listens to instructions and stimulus material and responds by speaking. These oral, viva-voce or interview-discussion tests generally do not involve any reading as part of the task, though prior reading and writing by way of preparation for the test is assumed to have occurred. Where the abilities to be assessed are more concerned with psychomotor skills rather than with verbalizations, the performance test is employed. Here, even if there is some reading, writing or speaking, the physical manipulation of materials is the main part of the required responses.

The most common variety of test, especially in our written-examination oriented system of education is the paper and pencil test. Even practical examinations in the sciences do involve in addition to the performance part a considerable amount of writing. The particular form of an item in a paper-and-pencil test is called its format. A number of formats

are available for testing cognitives objectives. They are listed below under two main categories:

(a) Supply type items

- blank-filling (with a word or short phrase)
- completion of a statement (definition gives some clues)
- short answer/paragraph answers
- essay

(b) Selection type items

- true/false and yes/no
- matching type
- multiple choice

Ever since objective type items were introduced into our system there has been a controversy about the merit and usefulness of such item. A lot of misinformed arguing takes place based on the consideration of the format of the items only. What matters in establishing the suitability of an item is the nature of the ability it demands of the testee *as he attempts* it, and not its external format. Appearances can be quite deceptive. For example, a multiple-choice item which externally involves only a "tick mark" may actually require the testee to make fine discriminations between complex statements in order to arrive at the correct answer. Conversely, an essay type question apparently calling for expression and organization may in fact require only the reproduction from memory of a stock answer to a stock question. The suitability and effectiveness of an item should be judged by an analysis of the cognitive processes involved in arriving at or producing the 'correct' answer—be it selection type or supply type. No item or item type is 'good' or 'bad' in itself. The suitability of an item for testing a particular ability for a particular level of pupil has to be established afresh for each new occasion.

(d) *Producing the instrument and administering it:* When a suitable number of items have been prepared these are assembled into a test or instrument. Quite often a test is made up of a number of sub-tests each concerned with a fairly specific ability. In preparing the finished or usable

version of the test all the instructions and stimulus materials have to be in the form in which the testee will see (or hear) them. Specific instructions regarding how and where he will record his response to the items are also essential. In the final printed or cyclostyled form the layout should be such that the material is clear and easy to read *for the testee*. Guidelines for the administration of the test should also be laid down clearly. How much time is to be allowed? Can the testees consult mathematical tables, dictionaries, etc? For oral examination will questions and related stimulus material be presented only once, or will they be repeated? Making such points clear guarantees that the process of administering the test is a standardized one. In other words, different persons administering the test to different batches of testees will follow essentially the same procedure.

(e) *Assessing the testees' responses*: The administration of a test yields a record of the responses—problem solving behaviour in effect—of the testees. These responses have to be weighed or assessed. This, as noted earlier, is the essential phase of the process of evaluation. This operation of judging the 'merit' of an answer can be handled in one or two ways. When the traditional supply type item is used, the response or answer actually produced by the testee is compared with some standard or model. The script reader or scorer has to go through this process for each response separately and award it a mark or grade according to its quality judged on a quantitative scale. When the selection type item is used, the testee does not actually produce an answer but chooses the one that he considers to be correct. Here the test constructor decides beforehand which of the options is the correct one, and the testee's is the correct one. In fact, scoring is reduced to a clerical operation which can even be done mechanically. However, a value judgement about the relative merits of different options is made in preparing the scoring key. Thus, a qualitative assessment of worth or value constitutes the core of the whole operation.

The assessment of a series of items or tasks (usually in a section or sub-test) related to a specific ability leads to the more general statement about the testee's status with regard to that ability: high or low level of ability. This is represented

as a mark or grade depending on the convention that has been adopted.

Measuring Outcomes in the Effective Domains

Though the importance of the non-cognitive aspects of growth is never denied, our school curriculum as a whole contains little organized instructional inputs related to affective behaviours. Most of what is encountered by the child is verbalized information or "talking about" desirable attitudes and values. The learning experiences that might foster personality development in socially valued ways are generally found in extra-curricular activities or in the relationships that a few sincere and dedicated teachers establish with their pupils. Clearly when there is no systematic instructional input, very elaborate testing procedures are not relevant. However, given our interest in the all round growth of children, the techniques for assessing development along affective dimensions will be mentioned briefly here.

In the literature on psychological testing the assessment of attitudes, interests and values is placed under the broad heading of 'tests of typical performance'. The attributes to be tested here do not yield 'high' and 'low' scores in the manner that ability tests do. It is meaningless to say "try harder" and "do better" in the context of interest or attitudes, because they are by definition aspects of behaviour that are normal or natural (and *not* specially produced to meet social demands).

The main technique for assessing typical performance is verbal self-report. Proformas, checklists or questionnaires which contain a series of statements or questions are administered. The student indicates his responses in terms of like/dislike, accept/reject, support/oppose, etc. It should be obvious that such responses are easy to "fake" or falsify. This is a problem inherent in the testing of attitudes and interest. Cooperation on the part of the persons being tested is essential.

Self-report by the individual can be supplemented by the systematic observation of behaviour. Here, it is necessary to prepare a list of observable behaviours that indicate or reflect interest in a particular area, a favourable attitude to some

object, etc. An observer then looks for these behaviours on the part of the pupils. Obviously such behavioural data is more dependable than individual self-report. However collecting such data is very cumbersome and time-consuming. For a modest size class of 30 pupils the resources required for observations related to just one or two aspects of affective development would be stupendous.

The Central Problem of Measuring Outcomes

When we are talking of curricular outcomes the testing requirement is more than just the measurement of the pupil's terminal behaviour. Achievement testing or 'examinations' in their conventional sense measure only end-of-course performance and virtually equate this with *learning* or *gain*. Of course, where the curriculum is based on an empirical needs analysis and the objectives are related to a realistic statement of initial ability (or entry level capability), it is probably safe to interpret performance as representing gains or achievement based on the curricular inputs. The meaning that is associated with a certificate or degree (or rather, with the related mark sheet or grade card) is that the candidate *at the end* of the course showed a certain level of ability. The "consumer" of educational certification—admission committees, employers, society in general—is not specifically concerned with how this ability was acquired. But in the context of evaluating outcomes this is the central issue. It has to be *established* not merely declared or asserted that the performance at the end of a programme is an *outcome of the curricular inputs* connected with it. In other words, a cause-effect type relationship has to be shown.

The standard procedure for obtaining measure of those learnings, that are very probably curricular outcomes, is to administer both a pre-test and a post-test and to compute the difference. Where a test or tests used for various abilities or objectives yield a numerical score (or a grade convertible to points) the gain score is fairly readily available; it only requires the subtraction of one score from the other. This is true of many ability areas and of some attitude and interest domains. But wherever qualitative judgements and comments are the means of expressing a "test-result" comparing the

pre-and post-measures will be far more difficult to do. However, changes in a desired direction should be visible when comparing the two sets of awards. Though a numerical value cannot be assigned, it should be possible to judge qualitatively whether change in a desired direction has taken place.

Most of the testing that is actually carried out in the context of instruction is related to one stage only—entry level, end-of-programme level, etc. The proper measurement of curricular outcomes must include 'before' and 'after' observation. Developing ways of doing this effectively and conveniently is a challenge to educational testing, that has yet to be taken up systematically. One of the functions of educational technology is to make available a wide range of learning activities, and hence task types. Hardware developments will also make available more sophisticated and dependable means of recording learners' responses to tasks. Educational technology may, therefore, play a significant role in the progress made towards the more effective evaluation of curricular outcomes.

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PART III

International Experiences

Planning and Developing Business Education Curriculum

Esogwa C. Osuala

Curriculum planning and development are complex activities involving various professionals from primary to graduate school. In most African countries, the task of developing the curriculum is essentially the responsibility of the Ministry of Education and of the boards of education in their respective countries.

Purpose of Curriculum Development in Business Education

The major purpose of curriculum study and development programmes in business education is to improve the quality of the services of schools in order to make them more proficient in fortifying students with broad knowledge and varied skills. Recent innovations in educational practice seek to aid the students in assuming enhanced responsibility for their own learning. Provisions for independent study, problem-solving and research within the framework of the regular school curriculum are demonstrated examples.

There is a continuing search for methods and procedures contributing to maximum growth on the part of each individual student. Curriculum planners employ the following innovations and ideas which represent a culmination and combination of several factors in curriculum development:

1. *Controlled Experimentation:* In this regard, functional, effective curriculums result from extensive testing of theoretical patterns in the educational laboratories.

2. *Action Research*: Vital curriculum changes result from the involvement in research of curriculum workers responsible for making changes. Effective business education programmes cannot be developed without close communication between the persons planning the programme and the businesses and industries which will employ the workers.
3. *Team Teaching*: The pooling of knowledge and talent by a group of teachers provides improved instruction in the classroom and this is utilised in subsequent curriculum development.
4. *Flexibility in Time Allotments*: Small group instruction is usually adjusted to the requirements of learning for less able students. This is normally taken care of in curriculum development.
5. *New Subject Matter Materials*: The functional aspects of subject matter in the lives of students are given due consideration in curriculum development.

The Ideal Business Education Curriculum

Although it is difficult, if not on occasions impossible, to develop an ideal business education curriculum, yet every school should endeavour to develop one. The following characteristics which are deemed to be essential for any ideal business education curriculum are suggested:

1. It should be comprehensive and varied in its offerings of choice for those preparing for employment and careers in business.
2. It should include the opportunity for all students to gain an understanding of the business world and the consumer world, thus facilitating intelligent consumer usage of the services and products of business.
3. It should provide the opportunity for all students to learn those skills and business abilities which they can use effectively in their personal lives.
4. It should be built on a foundation of economic and work attitudes and understandings interwoven into the elementary and secondary school programmes.
5. It should be organised to permit each student to

- progress at his own rate until he achieves valuable personal goals and also so interest and challenge him that he will maximise his opportunities and abilities.
6. It should be so organised as to reasonably assure the achievement of potentially saleable skills and abilities by the student at several points as he progresses in his school career; each new or improved skill or ability should further increase his job potential. Such a curriculum will provide a saleable skill for the drop-out, when needed, and yet help to prevent or reduce the incidence of drop-outs.
 7. It should be closely interwoven into the total guidance programme of the school.
 8. It should be constantly reviewed, adjusted, and improved by administrators and teachers to assure that it continues to be appropriate for the specific community, student body and social and economic needs being served.
 9. It should provide appropriate continuing education for upgrading and retraining of all who can profit therefrom.
 10. In its vocational aspect, it should give due attention to both preparation for the beginning job and preparation for advancement in a career.
 11. It should maximise the amount of attention given to the development of desirable personal qualities, traits, and attitudes in each individual student.
 12. It should use only such physical facilities and equipment as will: (a) meet the standards of modern business, and (b) assist in building pride on the part of the students in their own achievements and their preparation for a career.

The Curriculum in Business Education

Business education is simply one phase of the total educational programme. The curriculum in business education is a special area of instruction that deals directly with: (1) business skills and techniques; (2) business knowledge and facts; (3) business understanding; (4) economic understanding; (5) business attitudes; and (6) business appreciation

necessary to understand and adjust to that economic and social institution known as business.

Planning Learning Experiences: When the curriculum objectives have been defined, curriculum planning is then concerned with the means for attaining these ends. Essentially, learning takes place through the experiences the student has—that is, through the reactions the student makes to the environment. In planning an educational programme to attain given objectives, experiences must be selected or devised that are likely to help the student attain these goals. Several general principles are helpful in selecting and devising learning experiences. The most essential is to attain a given objective. For this a student must have experiences that give him an opportunity to practice the kind of behaviour implied by the objective. For example, if one of the objectives is to develop skill in problem solving, this cannot be attained unless the learning experiences give the student ample opportunity to solve problems.

A second general principle is that the results of the learning experiences should give the student satisfaction. For example, in the case of learning experiences to develop skill in solving health problems, it is important that not only the experiences give the student an opportunity to solve these problems, but also that effective solutions are satisfying to him. If the experiences are unsatisfactory or distasteful, the desired learning is not likely to take place.

Helping the Student to Go Beyond: A third general principle is that the reactions the student is expected to make in the experience should be within the range of possibility for him. To quote an old adage, "The teacher must begin where the student is, but help him go beyond." If the learning experience calls for a kind of behaviour of which the student is not yet capable, then it fails in its purpose. If the experience involves nothing new for the student, he can learn nothing from it. Clearly, the process of planning learning experiences is not a mechanical method of setting down definitely prescribed experiences for each objective. It is rather a creative process. The desired objectives must be considered. A series of possible learning experiences and materials should be outlined. As the list is developed, specific items are outlined in more detail.

The tentative draft of learning experiences are then checked carefully against the desired objectives to see first, whether the proposed experiences would give an opportunity for the students to carry on the kind of behaviour implied by the objectives, secondly, whether they would be satisfying to the students and whether they are appropriate for them. Revisions can then be made, so that experiences will be more effective. If the experiences are largely inadequate in terms of these criteria, then the tentative formulation should be dropped and others developed. Such a procedure furnishes opportunity both for creativity and for careful evaluation before setting up definite plans for the instructional programme.

Organising Learning Experiences

After devising a number of learning experiences for a programme, the business education teacher must decide how to organise them. Important changes in human behaviour are not produced overnight. No single learning experience is likely to have a profound effect upon the student, but if experiences are well organised, their cumulative effect can be great.

In organising learning experiences, the business education teacher should consider their relationship over a period of time and from one area to another. Experiences can be organised to furnish a continuing sequence, each experience building on but also going beyond the earlier ones. This is commonly called *Vertical Organisation*. The relationship between the learning experiences a student has in this course and those he has in other courses and outside the school during the same period, is called *Horizontal Organisation*.

Virtues of Horizontal Organisation: The importance of a sequential vertical organisation is generally recognised in curriculum planning. It is commonly seen as an opportunity for the student to use a skill that he is learning in one course and can be useful in another or to practise outside of school the skills being taught in the classroom. As far as possible, everything a student is learning should help him to understand and deal with the world more adequately. He needs to avoid putting knowledge in little compartments, each isolated from the rest. Integration of knowledge requires more cooperation.

among instructors in planning, but it is worth the effort in terms of the marked increase in cumulative learning that results.

Participants in Curriculum Planning

As was mentioned earlier, curriculum planning in most African countries is carried on by special persons not directly responsible for instruction. Obviously, curriculum handed down from a district or state office or developed by a project group is rarely implemented in the way intended. It is also true that an effective implementation of a curriculum requires that all the essential participants or actors: (1) understand the objectives and believe them to be important, (2) believe that the curriculum offers a constructive way for them to use their efforts, (3) know what is expected of them, and (4) can and do perform their roles.

Planning the curriculum of business education requires input by teachers, students, employers, parents and administrators. Therefore, the four conditions listed above refer to all of these people.

Employers Must be Included: In developing the business education curriculum, employers must be included among the participants in planning because of their knowledge about occupational needs and opportunities and because they will often be responsible for providing employment for students and graduates of business education programmes. It is also important to involve other community leaders in the planning, since they will have a significant voice in shaping policies relating to the transition of youth from school to work. They may also be able to contribute information and advice regarding what should be taught and how it can be learned. Furthermore, their involvement should help them gain an understanding of the educational programme as it relates to employability and the concomitant role of on-the-job training and other learning experiences outside of school.

Two Criteria for Participants: In general, the selection of persons in curriculum planning should be guided by two criteria: Whether they can furnish helpful information for curriculum planning and whether they will have a part to play in the implementation of the programme. Teachers have

contributions to make in all phases of planning because they have relevant information about students, content and learning, and they also will be the persons who conduct the programme. Students have a significant part to play in deciding what is to be taught because they have information about student needs and interests. They have a part to play in devising and selecting learning experiences that have been helpful to them in the past. Parents have a part to play in deciding what is to be taught because they are aware of their children's interests and activities. They should participate in planning learning experiences because they need to reinforce curriculum objectives through their attitudes and activities in the home.

Administrators, particularly principals, have a part to play in all phases of curriculum planning because they have helpful information and because they are involved in the implementation of the plans. Supervisors and consultants can also contribute much through their expertise. Finally, but also of great importance, are local advisory councils that include employers, union members, educators and other local leaders. The councils can furnish information about jobs in the local area where students are studying and residing and where most of the transition from school to work will take place. They can also help to devise and select learning experiences both for the school and for on-the-job training. They can assist in developing a sequence of learning experiences involving both school sites and work sites, shaping evaluation procedures and interpreting evaluation data. They can also be a rich resource for curriculum planning.

Purpose of Curriculum Development in Secondary School Business Education

Some of the important purposes of curriculum development in secondary school business education are:

1. To provide the means for periodic evaluation and subsequent modification as may be necessary to keep the school programme abreast of the changing student and societal needs. Among the many demands the future will make on secondary school education,

flexibility is perhaps the greatest. Business education teachers and students themselves must adapt to the rapidly changing conditions of the socio-economic scene with a minimum of hesitation.

2. To provide a sound educational philosophy for the school that will permeate all teaching activities. It is imperative that a very definite idea and understanding of the philosophy and objectives exist in the minds of all who are involved in the educational activity.
3. To increase the awareness of citizens of the purposes, programmes and problems of the schools. For a school to offer an effective programme in business education, it is necessary to understand the nature of the student population and the school community.
4. To foster the professional growth of educational personnel. In business education, the first measure of quality is the level of competence of its classroom teachers. The objectives, occupational structure, and operational patterns of business education also call for competency in a host of specialised abilities and understanding.

Objectives of Business Education Curriculum in Secondary School Education

It is the function of the curriculum of secondary schools to provide the means for students to have experiences that will influence their physical, social and emotional growth in desirable ways and toward desirable ends. The business education curriculum has the following objectives:

1. To afford all students the pertinent information to enable them to explore and learn about the world of work and the relevant interest and career area of their choice.
2. To help every student become an intelligent consumer of goods and services.
3. To provide the students with the necessary occupational information to enable them to understand the various occupations found in the world of work.
4. To provide training that will result in developing

individuals who are well-adjusted in the sense that they are capable of coping with the world in which they live and to provide the understanding and appreciation of the actual functioning of the economic system.

5. To enable students to acquire saleable skills in the fields of their choice.
6. To help students prepare for, choose, enter into and progress satisfactorily in occupations of their choice.
7. To train students for various business activities common to many professional, industrial, agricultural, distributive and home management occupations.
8. To enable the students to realise the advantages of business courses within their university preparatory programmes.

The above objectives for all business education subjects are meant to be used as a guide in evaluating the relative completeness of the business education curriculum in any school system.

Curriculum Offerings in Secondary School

The objectives of business education at the secondary school level usually perform a dual function: (1) they contribute to general education, and (2) they provide a form of vocational education. Two other groups of objectives of business education for the education of all youth are *general business education* and *communication skill objectives*. The general business education objectives may be broken down and studied in terms of their contribution to personal-business and consumer-business education as related to specific subject area.

Introduction to Business: Introduction to business course provides a special opportunity for orienting the student's thinking not only in terms of his own economic role, but also in terms of the total society of which he is a part.

Business Mathematics: Business mathematics is usually offered in the business education curriculum early enough to provide essential background necessary to achieve proficiency in other advanced business subjects. It is usually correlated

with general business and is a prerequisite to book-keeping and accounting.

Typewriting: Typewriting in the secondary school has for its major objective the facilitation of the communication process by means of providing more legible copy than long hand, and it is often a faster means of recording data or the results of the thought process. Typewriting provides the student with the opportunity to learn about English spellings, letter writing, punctuation and composition.

Economics: This course is designed as a basic course for all students regardless of occupational or professional interests, with the primary objective of helping students to understand the economic principles that are essential for participation as a citizen and voter in resolving economic issues, for wise management of one's economic affairs, and for performance as efficient producer in one's occupation or profession.

Economic Geography: Most secondary schools include economic geography as part of the business curriculum. It gives the students a knowledge of places, their physical relationship to goods and the consumption habits of people in different parts of the country.

Business Law: Business law is a course dealing primarily with the application of legal principles and procedures to the personal business problems of the individual. It promotes the understanding of laws regulating the total economy which affect the individual both as a producer and a consumer.

Vocational Business Education: Skill Subjects

Secondary school teachers of typewriting, stenography, office practice and business methods help prepare students who cluster around the mid-point in learning ability. This preparation is for middle-level office and business positions where communication skills are essential.

Office Practice: Sometimes this course is variously referred to as clerical office training, clerical practice, or office machines. The term "Office Practice" is a more inclusive title and is found most often on programmes of study of many secondary schools. The content of the course includes broad knowledge and procedures of the modern office in a changing world of business.

Transcription: Advanced stenography classes at the secondary level include transcription of shorthand notes or recorded dictation.

Shorthand: Shorthand is a vocational subject and is offered at the secondary school level.

Business Communication: Business communication or Business English, has as its primary objective to help the student solve his communication problems effectively.

Bookkeeping: Bookkeeping is the second most popular course in the business curriculum. It has three objectives in the secondary school curriculum: economic understanding, general education and vocational education.

Accounting: There is a tremendous and growing demand in business organisations for persons who have competency in accounting.

Data Processing: Automated data processing has influenced the curriculum in business education at the secondary school level. Although the inclusion of data processing instruction in the secondary school is a relatively new development, it appears that in the future, more schools will be involved in a total programme.

Distributive Subjects: Secondary school instruction in distributive education concerns itself with preparatory courses and pre-employment courses for such occupations as retailing and wholesaling, manufacturing, storing, transporting, financing, risk and insurance. Courses include the following: merchandising, salesmanship, marketing, advertising and retailing.

Cooperative Experience: The distributive education sequence should be designed to provide broad training related to distributive occupations—those followed by proprietors, managers or employees engaged primarily in marketing or merchandising goods and services.

Suggested Business Education Programme

The business education programme suggested below is designed for a two tier secondary school system, that is, junior secondary and senior secondary. Each tier lasts for three years respectively.

In the junior secondary school, the courses will be both

pre-vocational and academic. An attempt will be made to teach all the basic subjects which will help the student acquire further knowledge and to develop skills.

In the first year of the junior secondary school, therefore, the following subjects should be taught: Mathematics, English, Biology, Business Methods, Economic Geography, Commerce, Typewriting, Bookkeeping, Business Mathematics, Shorthand, Economics, Office Practice, Business Communication, Salesmanship and Language.

The subjects to be included in the second year are: English, Chemistry, Mathematics, Economic Geography, Commerce, Business Methods, Typewriting, Shorthand, Accounting, Business Mathematics, Office Practice, Salesmanship, Business Communication, Economics and Language.

Subjects offered in year 1 and 2 should be basically introductory in nature and compulsory. Students should not be allowed to select other subjects of their choice. In the third year, however, students are allowed to choose courses in their areas of specialisation. The programme in the third year is designed to make students, who will not complete a four-year course of secondary school, employable at this level.

The following sequence is recommended for students who plan to engage in clerical occupations at the completion of their third year: Business Methods, Typewriting, Business Mathematics, Accounting, Business Communication and Office Practice. The following electives are suggested: Economics, Business Law and Salesmanship.

The following subjects are suggested for the students who plan to do stenographic or secretarial work: Typewriting, Bookkeeping, Business Communication, Shorthand I and II, Accounting and Office Practice. The following subjects can be taken as electives: Business Methods, Business Mathematics and Economics.

For the Bookkeeping and Accounting group, the following subjects are recommended: Bookkeeping, Accounting, Business Communication, Business Methods, Business Law and Commerce. The electives may include: Business Mathematics, Economics and Work Experience.

For the students who plan to engage in selling occupations, the following sequence of courses is suggested: Typewriting,

Business Methods, Business Mathematics, Business Communication, Salesmanship, Retailing Management, Business Law and Commerce. The following subjects can be taken as electives: Bookkeeping, Key Punching and Economics.

The Senior Secondary School Curriculum

The senior secondary school curriculum should be designed to broaden the students' knowledge and outlook in the business world. The programme at this level will basically be the same as the junior secondary school programme except that the following new subjects will be added to the major groupings: Office Management, Office Machines and Cooperative Work to the Bookkeeping and accounting group. Transcription will be added to the stenographic group.

The University-bound Students: This group, as its name implies, will be given a programme that will prepare them for entrance into the universities after the completion of their secondary school education. The following sequence of subjects is recommended for this group: Typewriting, Office Management, Accounting I & II, Business Law, Key Punching, Mathematics, Science, History, Economics, Commerce, Economic Geography, Introduction to Business Organisation, Data Processing, English and Language.

Evaluating Curriculum Effectiveness

Even when a curriculum is planned and developed with great care and on the basis of ample information, it is not always as effective as hoped. The only way to insure a continually effective educational programme is by maintaining a continuing evaluation of objectives, learning experiences and the organisation.

Comprehensive Evaluation: A comprehensive evaluation of the whole curricular-instructional process at its completion will enable the teacher to plan those necessary programme changes the next time around. This evaluation should include two-way communication between the teacher and the student. In such communication, the business education teacher should indicate the progress he thinks the student has made, what his strong and weak points are, what will need more work in the future, and the new direction he might take in

the future. The student, on his part, should indicate what he thinks he has learned, where the instruction was helpful or confusing, and the kind of improvements the teacher might make in future.

Ample time should be made available for teachers and students to have individual and group evaluation sessions. This comprehensive evaluation should include an assessment of the adequacy of the instructional materials, such as films, slides, teaching machines, supplementary textbooks, reference books, field trips and so forth.

In addition, the business education teacher should ask himself whether the use of time and space was helpful. Is there any way of revising the class schedule to allow for longer or shorter periods, for small groups and for more individualised attention to certain students? From this general overview, the teacher also needs to reflect on the high points and the low points of the course and try to evaluate the probable reasons for both. Such a comprehensive final evaluation, while the experiences of the programme are still fresh in the teacher's memory, will enable him to make necessary decisions about changes in the curriculum in the future.

Conclusion

Thus, in most African countries, the task of developing the curriculum is the responsibility of the various Ministries of Education. The main purpose of curriculum study and development programmes in business education is to improve the quality of the educational services.

Curriculum planners in business education employ the following innovations and ideas in curriculum development: controlled experimentation, action research, team teaching, flexibility in time allotments and new subject matter materials. Business education curriculum should be comprehensive and varied in its offerings of choices for the students preparing for employment and for the college-bound students. Planning and developing curriculum of business education require actions by teachers, students, parents, employers and administrators.

It is the function of the curriculum of secondary schools to

provide the means for students to have experiences that will influence their physical, social and emotional growth in desirable ways. A comprehensive evaluation process in business education provides a continuous and responsible basis for decision-making throughout the curricular-instructional programme. Only by means of an ongoing evaluation process can the programme be improved and adapted to the human needs of students and hence result in more effective student learning.

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Evaluation of Educational Media: Some Issues*

Martin Carnoy and Henry M. Levin

Given the enormous educational problems that the governments of UNESCO's Member States have to solve, the millions of illiterates they have to teach to read and write, and the urgency of finding solutions to these problems, I would recommend those responsible for education at the highest level to study the following pages in order to become acquainted with the experience gained in including the new techniques in plans for development of education. True, the new media will not bring about a miracle in educational systems, but if used efficiently, they are certain to help education "go further, do more and do it better." More important still, the new techniques may weld education and society together more closely.

Rene Maheu, Director General, UNESCO in Foreword of Wilbur Schramm, *et al.*, *The New Media: Memo to Educational Planners*, (Paris: UNESCO, IIEP, 1967).

"Formal lessons, in so far as they exist, will be conducted by means of the cinema or the radio, so that one teacher can give simultaneous lessons in all the classes throughout a whole country. The giving of these lessons will, of course, be

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recognized as a highly skilled undertaking, reserved for the members of the governing class. All that will be required locally to replace the present-day school-teacher will be a lady to keep order, though it is hoped that the children will be so well-behaved that they will seldom require this estimable person's services."

Bertrand Russell, *The Scientific Outlook*, (New York: W.W Norton, 1962, p. 244, 1931).

As the above two quotations attest, beauty is so often in the eye of the beholder. The same phenomena when filtered through different lenses provide contradictory visions. The specific media include educational radio and television (Hornik; Jamison and Klees; Lumsden and Ritchie; Mayo, McAnany and Kless), computer-assisted instruction (Suppes, Fletcher and Zanotti), and video-tape instructional systems (Wagner). Each of these papers treats its subject in a thoughtful and (generally) competent manner, and the compendium is well above the average level of literature that has proliferated on these subjects. Clearly the essays tend to reflect the optimism of Maheu rather than the skepticism of Russell. In order to redress this imbalance, we have been asked to provide a critical review of the presentations.

While the papers are diverse in their views on such dimensions as the nature of the media, applications, and even types of analysis, they do share one common factor. All of them tend to build a favourable case for the specific approach that is being explored. This is not to say that the authors are overtly partisan towards the media that they review. Rather, their advocacy is part of the very modes of analysis with which they look at their subjects. In this short discussion we will attempt to provide a systematic presentation of the implicit biases which lead to such favourable results. We will not argue that a more balanced evaluation would lead to different conclusions, for we do not know that to be the case. Nevertheless, we will assert that most of the concerns that we raise are ones that tend to elevate the relative performance of the technologies in comparison with the more traditional alternatives.

Before proceeding, it is important to note the source of differences between our viewpoint and those of the others. Many have been closely associated with the implementation and evaluation of one or more forms of educational technology, and in most cases this focus represents their dominant professional concern. Within this context they have been able to experience close contacts with both the phenomena that they are reporting on and the agencies that fund research on these matters such as the Agency for International Development (AID) and the International Institute for Educational Planning (IIEP) of UNESCO. They have worked directly with the progenitors of the projects that they have evaluated, and often their evaluations have been sponsored directly by the agencies and personnel who have planned, funded, and implemented the particular educational technology that is being reviewed.

This close association has several advantages. First, the evaluator is likely to have a highly refined knowledge of the origins of the project and its actual workings. Second, his close association with the project and its personnel will enable him to obtain information more easily than where he is considered an "outsider." Finally, it provides both continuity of experience and a comparative perspective since the evaluator is likely to have continuing experience with the different applications of similar technologies in different settings as well as comparative technologies. That is, since a relatively limited number of funding and planning agencies dominate the educational technology sphere, they tend to call on the same evaluators to review their plans and applications.

Such an intimate relation also creates possible handicaps for a balanced evaluation. First, the close professional and personal association with personnel can lead to an evaluator's self-identification with the project and a subconscious unwillingness to be critical or negative about the project's performance. Second, the close relation with the sponsoring agencies can further hinder a truly critical perspective and limit the evaluation only to the issues which are important to the agency footing the bill. Neither of these risks is peculiar to evaluators of instructional technology, since virtually all evaluators are influenced by such factors. In

contrast, we admit to some skepticism about the claims of instructional technologies by their advocates, and we believe that our skepticism is well reinforced by analysis of the data (Carnoy, 1975).

We will argue that other evaluations of instructional technology are characterized by two types of biases. The first is called the "*benefit of the doubt*" or BOD aspects of the analysis which tend to accept and utilize very deficient data when they favour the instructional technology over traditional alternatives. We will give some illustrations in the next section. The second bias is that which is reflected in the narrowing of the scope of the analysis to those items on the agenda of the sponsoring agency while ignoring other effects. This aspect will also be discussed below.

Benefit of the Doubt: The benefit of the doubt bias is really best described as one of different standards of evidence. James Q. Wilson (1973) has set out two laws that he believes apply to all cases of social science evaluation of public policy:

First Law: All policy interventions in social problems produce the intended effect—if the research is carried out by those implementing the policy or their friends.

Second Law: No policy intervention in social problems produces the intended effect—if the research is carried out by independent third parties, especially those skeptical of the policy.

These laws may strike the reader as a bit cynical, but they are not meant to be. Rarely does anyone deliberately fudge the results of a study to conform to pre-existing opinions. What is frequently done is to apply very different standards of evidence and method. Studies that conform to the First Law will accept an agency's own data about what it is doing and with what effect; adopt a time frame (long or short) that maximizes the probability of observing the desired effect; and minimize the search for other variables that might account for the effect observed (Wilson: 138).

It is Wilson's first law that reflects the benefit-of-the-doubt

bias that we believe characterizes a variety of assumptions that favour the results of the instructional technology as well as differential standards for data collection on costs seem to permeate the studies.

It is only fair to point out that according to Wilson's second law, skeptics will find other interpretations of the observed phenomena and will question the data that are employed (Wilson: 138). Certainly this is the stance that we are taking, and the reader should be so informed in order to assess the basis of the difference in view.

We believe that in almost every case *the reported costs of instructional technologies are understated relative to their true costs*. Moreover, the standards for measuring costs of instruction are different between the instructional technologies and the traditional approaches, so that the costs of the former will be particularly understated relative to the latter. We will argue that these downward biases in reported costs are systematically related to the methodologies employed for cost estimation.

What are the methodological treatments that create these biases? First, the estimated costs of the instructional technologies are often based upon "*drawing-board approaches*" to what costs might be rather than actual cost experience. Both the expansion of the Mexican Telesecundaria (Mayo, McAnany, and Klees) and the Ivory Coast cost estimates are based upon a variety of untested assumptions. Such an approach invariably imparts a downward bias because various cost components are omitted—although later experience will show that they are required—and cost estimates of future implementation of instructional technologies are invariably understated. This latter rule is true whether we talk about the development of weapons systems, instructional systems, or supersonic aircraft such as the Concorde. Careful assessment of costs is impossible without experience, and experience shows that the drawing board estimates are invariably lower than actual costs when the project is implemented. Fortunately, there is direct evidence on this point. After Klees and Jamison wrote a paper, Jamison had an opportunity to review the actual cost experiences for the Ivory Coast for the first years of the project. He found that not only were his reported

costs drastically understated, but that they were rising considerably over time.

Even when cost data based upon experience are available, only in very few cases is any serious attempt made to use careful cost accounting procedures. Again, this factor tends to understate estimated costs since crucial ingredients are not included in the estimates or their true costs are understated. Improper costing, for example, is reflected in a study done for the AID on the El Salvador system of educational television (Speagle, 1972), whereby he assumes that the cost of capital is zero and ignores other cost items as reflected in the present re-analysis by Jamison and Klees. When these components are costed out, one finds that the original estimate of average costs is understated by almost fifty per cent.¹

But costs are also understated for other reasons. First, several of the studies do not include all project ingredients when they calculate costs. In particular, the values of contributed inputs, such as contributed facilities (Mayo, McAnany and Klees; Lumsden and Ritchie; and Wagner), are often ignored. In virtually all of the AID funded studies the costs of technical assistance and advice tend to be ignored or understated. These deficiencies in costing are especially widespread, and they are conceptually unsound. The issue of who pays for particular project components and the true costs of a project should be separated. An evaluation of costs should attempt to measure the full cost of implementing the instructional technology regardless of how the costs are distributed among countries, government agencies, private contributions, and so on (Levin, 1974). Once knowing the total cost of the project, the burden may be shown according to who pays. But to assume that cost components supported by other entities should not be treated in a cost analysis is not correct either conceptually or in a policy framework.

Compare this treatment of costs of instructional technologies with those of the traditional alternatives. First, the

1. Even these adjustments do not guarantee the accuracy of the adjusted cost figures since Jamison and Klees were not able to check the validity of the other cost estimations in the Speagle report. We have argued that any omissions in the original study are likely to bias the cost estimates downward.

latter costs are based upon actual experience rather than on drawing-board assessments. Accordingly, the difference in methodologies of cost assessment alone will tend to understate the costs of educational technologies relative to the more accurate measures for their traditional counterpart. In contrast with the actual cost experience of traditional instruction, we have only the invariably optimistic "*projected*" costs of the technological alternative. Thus, the difference in methodology of estimating costs in itself will be the source of an erroneous comparison that will favour technology.

Second, the omission of contributed inputs such as facilities and technologies also biases their cost assessments downward relative to the costs of traditional approaches. The latter are likely to have far smaller components of contributed inputs by virtue of the fact that they have long been an institutionalized offering of the government. Thus, even if cost estimates of both educational alternatives and the existing practices ignore contributed inputs (those resources provided by other governments, agencies, industry, or families), the effect will be to understate the costs of the instructional technology by a larger factor than those of the existing approach.

The BOD bias is also reflected in the statements of effectiveness. Consider that in almost all cases a narrow measure of educational attainment is used to assess educational outcomes or no measure of effectiveness is used at all. Is it appropriate to assume that students receiving video tape instruction in factories are receiving the same education as those on campus who have regular access to faculty, other students, or libraries? Is it correct to assume that the value of an Open University degree will be similar to one from Oxbridge or the "Red Bricks"? Such a presumption simply ignores the credentialing effect of higher educational institutions as well as the fact that Open University students are not being socialized in the same way as their counterparts in traditional universities. The latter students are spending most of their time in contact with fellow students, faculty, and academic facilities that go far beyond the short exposure to course instruction and required instructional materials.

Is the Mexican secondary student in the Telesecundaria

receiving the same inputs with respect to non-televised material as his counterpart in the traditional school? Consider that the teachers in the Telesecundaria are themselves the product of only a primary education with a secondary training for teaching primary children. That is, the Telesecundaria teachers themselves lack secondary training in many of the subjects that they are teaching since such subjects are not part of the curriculum for "*Normalistas*." In contrast, the regular secondary classes (ED) are staffed by teachers with academic training at the secondary level and pedagogic training at the postsecondary level. But, a few test scores on conventional subjects are probably not adequate to reflect the greater teaching inputs of the latter teachers. Rather, we do not find it surprising that a larger portion of the students in the traditional schools desired university-level training and professional careers than those in the Telesecundaria. Unfortunately, the emphasis on test scores may obscure what may be a far more important finding in evaluating the two alternatives.

Of course, the BOD assumptions on benefits are widespread throughout the literature. These are based upon the assertion that comparisons of newer educational technologies with the more traditional alternatives show no significant differences between the two approaches on student test scores. Generally, such evidence is based upon testing a relatively narrow domain and generalizing this to all educational impacts (Chu and Schramm 1968; Schramm 1973; and Jamison, Suppes and Wells 1974). Indeed, Jamison and Klees rely upon these studies in their global statement that "... these media (educational TV and radio) are good substitutes for conventional instruction of reasonably high quality." Yet, none of these studies considers the other factors that are evident in traditional instructional systems that affect both cognitive and socialization outcomes. Further, recent analyses of the determinants of earnings suggest that cognitive factors are not very strong predictors of income and other measures of lifetime success; and that the noncognitive aspects of school socialization seem far more important factors in determining such outcomes (Gintis, 1971; Bowles, 1973; Bowles and Nelson, 1974).

By omitting these other factors, the claims of "*equal success*" in educational results is unsupported and derives from a narrowing of what constitutes success to the specific test instrument used to assess instruction rather than to assessing the wide range of outcomes that schooling contributes to. This is an especially serious problem in a cost-effectiveness study because the evaluation instruments are invariably designed to compare the instructional approaches on the basis of what the instructional technology is designed to achieve rather than the far larger range of outcomes that the traditional systems of instruction focus on. Yet the cost comparison is one that includes cost components of traditional instruction that contribute not only to the narrower output, but also to the other goals of the traditional instructional process.

Consider that the appropriate cost comparison of educational television or radio for mathematics and reading proficiencies should be one which compares the costs of these technologies only with the costs of alternative or traditional costs of teaching mathematics and reading. That is, only the pro-rated costs of teacher time, instructional materials, facilities and so on that are devoted to these subjects should be compared with the costs of traditional instruction. Yet, the tacit assumption is that the cost per hour of instruction, per subject, or per degree is appropriate comparison between the two forms of instruction as evidenced by Jamison and Klees, Wagner, and Lumsden and Ritchie. Such a comparison will overstate the costs of traditional instruction that is utilized to meet only these objectives since some of the cost of traditional instruction is used to fulfil other educational and socialization functions.

While we have referred to some of the individual studies to illustrate our general points, it is useful to mention briefly some aspects of each study which might be reviewed in the BOD context. We will tend to be critical in order to bring out the issues that we believe are important within the context of this review. We hope that the reader does not lose sight of the general quality of the papers we are considering, and the lack of detailed praise is due to the critical mission of our assignment.

Hornik

Hornik's views on the introduction of educational television in El Salvador is based upon the much larger study that he and his colleagues carried out (Hornik, *et al.*, 1973). In his presentations, Hornik concentrates on the apparent success of educational television compared to the more traditional instructional approach, in reducing the relation between student background and learning. In our view he makes some misleading interpretations of his data. First, he never acknowledges the fact that the dropout or nonparticipation rate in education in El Salvador is so high that only about one-third of the children reach the seventh grade. Accordingly, any comparison of the correlation between socioeconomic background and test performance among that select group with that for the U.S. which has almost complete educational participation of its young at grade seven is inappropriate.

Second, Hornik's comparison with the U.S. is erroneous. According to the Coleman Report (as reviewed in Mosteller and Moynihan, 1972, pp. 14-15), there was a relatively constant standardized difference between the test performance of white children and children of other races over the different grade levels. Typically, the mean test score of blacks was between 1 and 1.1 standard deviations below that of whites at all grade levels that were tested. Of course, a standard deviation represents a larger difference in "*grade equivalent scores*" at higher grades than at lower ones. However, this has nothing to do with the correlation between race or background and test scores. Rather, it is an artifact of the test measure. Even with the slight reduction in the correlation between background and test scores of students between grades seven and nine in El Salvador, the difference in "*grade equivalent scores*" from grade seven to nine between students with low socioeconomic backgrounds and those from higher origins is likely to have "*grown*" over that time. Accordingly, Hornik has used two different standards in making the comparison between the U.S. and El Salvador, and his conclusion of differences between the two with respect to changes in the relation between socioeconomic background and achievement at different grade levels is not supported by the evidence that he cites.

While there is some evidence of a statistically significant difference in favour of the instructional television, we know nothing about differences in treatment nor the educational significance of the differences. The BOD aspect is reflected in Hornik's assertion that "... the amount of change (in the performance of ITV classes) was large and significant." Since the metric of test results that the author used was only a rank ordering, it is impossible to make such a statement. That is, we have no way of knowing how large the relative gains in cognitive achievement were from a statistical analysis of rank orderings. Further, Hornik does not even consider that changes in rank orderings can be due to other factors such as Hawthorne effects and non-random assignment that might surround instructional television. Certainly, Hornik's views on the latter point is not reassuring in pointing out the biases in favour of the ITV classrooms even though he tends to minimize the differences.

Wagner

Leslie Wagner reviewed a T.V. videotape system that provides off-campus education for persons in the work place. While Wagner has made thoughtful analysis of the project, there are certain BOD implications with relatively favourable conclusions. First, questions are not raised about the quality of experiences and results under the videotape approach in contrast with the on-campus instruction. The lack of faculty, library facilities and a university environment would suggest that different experiences and outcomes might be evident between the off-campus and on-campus approaches. However, these possible differences are ignored, and the analysis is restricted to a comparison of costs between the videotape classes and conventional instruction.

But, again there are different systems of accounting for costs between the two alternatives. Only the direct costs of producing the videotapes are included in the cost of the off-campus classes. It is not even clear that the courier costs for delivering the tapes to the outlying setting are included in the estimates provided by Wagner. More serious, all the costs of facilities at the firms for showing the tapes are ignored because Colorado State University is not paying for them. Further,

the extra time required of faculty for preparing the videotaped lectures and for periodic visits to classes is not included. Thus, the comparison of costs for offering the course at the University with that of the off-campus instruction tends to understate relatively, the costs of the off-campus instruction. While the off-campus classes may save Colorado State University some money—and that is not clear from the analysis—the total costs that are borne by all the participants together seem to be greater in the off-campus case. (Even the opportunity costs of instruction in the two settings should not differ for part-time students, but the other costs appear to be higher in the off-campus case once all costs are accounted for.)

In favour of the video-tape system is the possibility that it is the most cost-effective method of providing small group instruction for students who reside in outlying areas. That is, perhaps the comparison with the costs and benefits of conventional instruction is inappropriate since it is unlikely that a Colorado State University would be constructed in out-lying areas given the much less demand for instruction. It would seem that the more relevant comparison, then, would be one that contrasts the video-tape approach with other feasible technologies for students in such locations. We suspect that this type of comparison would show rather favourable results for the video-tape alternative because of its high flexibility and low fixed-cost requirement in conjunction with its reasonable variable costs.

Jamison and Klees

Jamison and Klees have made a useful survey of both methodology and some actual cost estimates. Yet, we believe that the apparent precision embodied in showing how cost functions are derived and applying them to existing data also tend to give an air of greater validity to the data than they deserve. Much of the cost data that they review are "*drawing-board estimates*" rather than information based upon experience, and we have asserted that such costs are *always* understated by the advocates of instructional technology systems. The Ivory Coast case is a useful example in this context, because the actual costs are considerably higher than those utilized by Jamison and Klees.

Even when cost figures are derived from ongoing projects, they have not been based upon careful cost-accounting procedures. Indeed, the procedures of costing out different factors are not even consistent across studies. While Jamison and Klees are able to make some adjustments in the data for El Salvador by adding other costs that were neglected in the original cost study, they are unable to review the cost analysis in any detail for the other countries.² An examination of the sources that they note for several of the countries (Columbia, Thailand, and El Salvador for example) is very disconcerting with respect to the exact methodology, thoroughness, and accuracy of the cost estimates.

Finally, we must note that the use of a cost-per-hour figure may be very misleading as a comparison metric for two reasons. First, such a figure is highly susceptible to utilization rates, and we believe that the history of such projects indicates that utilization rates are often overestimated. To the degree that the rates are based upon actual usage, this criticism does not hold. The second problem is a more subtle one. By using a cost-per-hour figure, the impression is given that this is the appropriate measure for comparing new instructional technologies with more traditional instructional approaches. What is lost in such a comparison is the fact that the more traditional technologies are oriented towards a much wider spectrum of educational goals than are such approaches as educational radio and television with their subject-specific programming. Accordingly, the comparison should be made only between the cost of an hour of intensive mathematics instruction or reading instruction and their relative impacts and an hour of typical classroom time spent on mathematics which may provide a much more integrated learning framework with respect to other subjects than the comparable television or radio offerings. Probably much

2. Engineers who design instructional systems typically overstate the utilization capability, and planners typically overstate the utilization demand. An example of the former is the PLATO computer instructional system at the University of Illinois which was originally designed to service about 4,000 user terminals simultaneously. In fact, a maximum utilization rate of less than 500 terminals seems to be the actual capacity of the system.

more mathematics and reading instruction could be crammed into a period of time if teachers were to concentrate on those subjects to the exclusion of all other goals; and essentially this is the set of conditions that should be compared with most educational radio or television instruction of those particular subjects.

Lumsden and Ritchie

The Open University is one of the most interesting developments in the use of educational technology. Therefore, a cost-effectiveness analysis or cost-benefit analysis is very instructive when considering the Open University as an alternative to the more conventional post-secondary instruction situations. There are at least two sets of BOD assumptions that are implicit in this study that tend to favour the Open University. First, the costs of local libraries, college and other facilities that are utilized by the Open University students for study and reference, and also the tutorial components of the curriculum, all of which are subsidized by other units of government are ignored. The fact that the average cost to the Open University of such facilities is only about £2 per student suggests that the subsidy is substantial. Again, we believe that *all* the social costs of the Open University, should be compared with those of conventional universities, and that the sources of support should be allocated as a separate exercise. It is the former that should be considered with respect to comparing the social cost of the two endeavors. Even so, the authors find that the cost differential is surprisingly small, from 9-27 per cent depending upon assumptions.

Yet, is it possible that even these cost savings are obliterated by a smaller educational product? Consider that the average university student receives not only instruction and instructional materials, but he receives substantially more tutorial services, contact with fellow students, access to libraries, computers and campus lectures than does his Open University counterpart. Indeed, much of the value of a university education is probably reflected in its socialization content that is not captured by the examinations per se (Feldman and Newcomb, 1969). Lumsden and Ritchie simply assume that degrees from the Open University are comparable

to those of other universities, and the issue is tacitly dropped. We believe that a more realistic premise is that the limited nature of the Open University education as well as the credential effect of particular institutions on earnings and occupational attainments would suggest that the Open University graduate is not as likely to receive either consumption or income benefits from his education that are as high as those of the person from the more conventional university setting (Solmon and Taubman, 1973). Even a relatively small difference in the impact of the degree (e.g. 10 per cent lower earnings than comparable graduates of other universities) would tend to obliterate a 9 per cent cost saving.

Mayo, McAnany and Klees

In this very useful study, we also see several instances of the BOD bias that makes the Telesecundaria look relatively more favourable than is actually the case. In an earlier version prepared for the AID (Mayo, McAnany and Klees, 1973) it was assumed that an expansion of the conventional schools into rural areas would require relatively greater expenditures than the expansion of Telesecundaria. In fact, this was the result of using different methods of estimating costs where it was assumed that Telesecundaria would use portions of existing buildings such as churches while the conventional secondary school would require regular school facilities; administrative cost differences were also based upon standards that would favour the Telesecundaria. Essentially, the authors used the actual costs of urban secondary schools to estimate the costs for rural expansion under a traditional system; but for the expansion of Telesecundaria they used the costs of the experimental Telesecundaria schools set up in buildings used for other purposes and having low administrative costs. Yet, obviously there is nothing intrinsic about the Telesecundaria that enables it to use available buildings and low administrative inputs that does not also pertain to the expansion of conventional secondary schools into rural areas. The number of students served and the locations would be comparable, and if anything one would suspect that the Telesecundaria would have higher administrative and facility

costs by virtue of the technological requirements of the equipment and its usage.

The conventional secondary schools require teachers who receive a more conventional secondary education with pedagogical training at the secondary level. The question that immediately comes to mind is that of how adequate the teacher preparation is for addressing material or student needs which are not reflected in the televised instruction. It seems peculiar to us, that the authors argue for no difference in educational results, on the basis of the relatively narrow test results, given that many of the Telesecundaria teachers have probably had no more contact with the academic secondary subjects than the students themselves. Indeed, the fact that the test scores are relatively similar in the Telesecundaria and the conventional 'secondary schools seems to be less important than the rather substantial differences in desire for university-level training and professional careers that favour students in traditional schools. The relatively passive approach characterized by television programming and undertrained teachers in the Telesecundaria may not prepare students as well for further training and higher level careers as the more interactive mode of conventional instruction. The fact that these educational attributes are not necessarily reflected in test scores is indicated by the findings that only a small portion of differences in earnings associated with schooling seems to result from test score differences in cognitive knowledge (Gintis, 1971).

But further, even the cost differences associated with the less-trained teachers may be misleading. Recently, the Telesecundaria teachers went out on strike in demands for higher salaries, partially in response to their understanding of the cost savings represented by the Telesecundaria. The government yielded to their demands so that at least part and perhaps most of the cost gap has been closed. This phenomenon has not only reduced the cost advantages of expansion of Telesecundaria, but consider the further increase in political impact of the additional teachers required to service one million pupils rather than the 29,000 who are presently enrolled. Certainly, any cost savings that still exist according to present estimates will appear very tenuous with a

thirty-fold increase in the political power of teachers of the Telesecundaria to strike and demand even greater salaries to reflect their allegedly higher productivity.

But even the small differences in the test score results are suspect: the starting scores indicate either that the tests are poor measures of cognitive knowledge, or that the student population in the urban traditional seventh grade is very different from that attending the Telesecundaria classes. The pre-treatment results show rural students scoring higher on Spanish language than urban students, an unusual result unless the rural students who were tested come from a higher social background than the urban students, are older, or are more highly motivated toward school learning in other ways. Mayo, McAnany and Klees argue that the educational attainment of fathers of the rural students is lower, but educational attainment (which is the most valid of the measures used) is a poor indicator of social class background in rural areas, particularly in comparison with urban areas. Furthermore, a student reaching the seventh grade in rural Mexico is a member of a much more select group than a seventh grade student in urban Mexico. In 1970, only 18 per cent of the population in the 6-14 year-old age group in all Mexico (both urban and rural) completed the sixth grade as compared with 33 per cent in the Federal District. Both of these factors would tend to make the rural pupils in the sample better learners than the urban sample with or without instructional television. On the other hand, the rural sample might be older than the urban sample, which could also explain higher initial Spanish scores. But this factor might make the Telesecundaria pupils poorer learners than the urban pupils sampled. All of this indicates just how complex measuring the relative effectiveness of two alternatives is. Certainly in this case, there is no justification in assuming that a system with 29,000 pupils—not chosen at random from the rural population—can be projected into a rural system with a million pupils without a much more circumspect understanding of representativeness and generalizing of results.

In the preceding discussion, we show that “*benefits of the doubt*” tend to favour newer educational technologies in

comparative evaluations with more conventional instruction.

Ignoring Other Effects

Up to this point, we have been critical of several viewpoints within their own scope; we have taken the measures of effectiveness and costs as the evaluators have defined them and discussed their shortcomings and possible biases. But the "*benefit of the doubt*" problem is just the tip of the iceberg. Implicit in each of these evaluations is a choice of objectives, generally defined as minimizing the cost of teaching certain cognitive skills or minimizing the cost of providing formal schooling to a greatly expanded number of school children. The evaluator of a particular instructional technology project who is asked to do no more than to provide a comparison with other forms of instructing children or adults in these skills can legitimately limit the investigation to such objectives. Even more, he or she can argue that supplying increased schooling to the young is a national objective of most countries; thus, it is worthwhile to find the lowest cost method of increasing schooling.

However, from the broader, social viewpoint, we cannot limit our judgements about instructional technology to such objectives. First, we must question the role of expanding formal education through instructional technology in contributing to the economic and social welfare of the population. The corollary of this question is to ask: what are the economic and social objectives for which educational media have been most effective, and how do these compare with societal objectives which evaluators consider important and just?

We can raise the following questions more specifically by applying them to the viewpoints made so far.

1. In the McAnany, Mayo, and Klees study of Telesecundaria, it is apparent that the appeal to planners of instructional television in rural Mexico is based on the notion of economics of scale. That is, since there are relatively few secondary school students in each of many widely dispersed rural towns, it would be expensive to provide traditional secondary education for 30-50 students in each place. Instructional television allows these small groups of students

to receive urban-quality instruction—at least in the formal cognitive aspects of secondary education—at a lower cost (according to the study) than if the education were provided in the traditional manner. Intuitively, it is the scale advantage which makes the strongest argument in this case. It seems reasonable that a centrally-run televised secondary programme will be cheaper than many underutilized secondary institutions spread around the countryside.

But the scale argument only makes sense if it is assumed that all, or many, of the pupils in rural areas should have the same curriculum, and that a curriculum should be provided by a central, urban-based, educational media programme. To answer our earlier question, in this case, the logical effectiveness of the proposed system relies on an assumption of homogeneity of needs among widely-spaced communities with highly varied development problems, levels of income, and social milieus. Furthermore, Telesecundaria in Mexico, according to the description provided by McAnany, Mayo, and Klees, implicitly (or perhaps even explicitly) assumes that the role of the secondary school is to turn rural teenagers into potential workers in the urban labour force. There is nothing in the Telesecundaria curriculum that indicates a concern with rural problems or with rural development. Indeed, we can speculate that the cost-effectiveness of Telesecundaria would be much lower if rural development were its goal, since rural development problems are much more *area-specific*. A secondary school training programme that addresses basic education plus the solution of area-specific problems would require highly trained teachers in addition to television sets, increasing the cost of secondary schooling in rural areas considerably over what the Telesecundaria planners envisage.

We have evidence that rural development has not been an objective of the Mexico government since the mid-1930s (Barkin, 1972); thus, it is not unusual that an instructional media effort in rural areas would be geared to preparing people to leave rural areas to join the mass of urban workers. On the purported advantage side, secondary-trained workers from rural areas might be in a better competitive position to secure jobs than their urban primary-trained competitors.

This assumes that cognitive knowledge determines job selection—a highly questionable assumption—as we have noted above. Further, once they come into the cities en masse (for example, if Telesecundaria is extended to 500,000 pupils), they will inflate vastly the marginal and underemployed populations that already surround every one of these cities, and they will be no better off than their poverty-stricken urban competitors.

The point is that simply extending additional education to Mexico's rural young does not, in itself, lead to an increase in their economic and social welfare. Indeed, the Telesecundaria programme as it is described seems to have advantages over traditional education primarily in the case that the extension of secondary education into rural areas will produce a mass of urban workers better trained than if they migrate to cities without that additional cognitive knowledge. The promotion of rural development in Mexico would not only require a commitment of the Mexican government to such development (at the expense of urban development) but would also require a different type of education for rural young people and even urban dwellers. We have to ask ourselves whether the type of development to which Telesecundaria is contributing is consistent with our desires for the resultant welfare of people living in rural Mexico.

2. Hornik's study presents a similar problem; in his evaluation of educational television in El Salvador, he limits his discussion of success or failure to the test scores of pupils in schools with television and without. Indeed, all evaluations done of ETV in El Salvador have concentrated on cost-effectiveness in these terms, ultimately showing that it is possible to maintain or even increase test scores with television, at the same time lowering cost per pupil of instruction at the secondary level (Jamison, 1973).

The expansion of schooling in Salvador is based on a government objective to provide increased schooling for the population. An important aspect of the reform accompanying the introduction of ETV is 'brought out in a film about the project: much of the new curriculum in the seventh to ninth grades (where ETV is used) is oriented toward industrial arts subjects, preparing a better qualified labour force for industrial development. However, the Salvadorian government has been reluctant to allow a cost-benefit study of

educational expansion at this grade level, primarily because—from our understanding of the situation—many signs indicate that the newly educated are having difficulty finding work. Again, as in the Mexican case, the introduction of television may be well suited to preparing people for work which does not exist.

In reality, expanded education by means of ETV has not been shown to improve a country's potential economic and social capability or distribution of income; rather, such technological innovations seem to be utilized in places like Salvador, Samoa, Ivory Coast, and Korea to increase the number of years of schooling in a potential urban labour force. In our view, the most important result of this "strategy" is to increase the cognitive skills of the reserve army of the unemployed, putting downward pressure on the wages of both skilled and semi-skilled labour. In the Salvadorian case—since there is little domestic investment that can utilize this increased schooling—the strategy also implies economic development based on foreign investment, investment in the assembly of goods for re-export to the high income countries. We do not want to go into an analysis of the implications of this type of economic development for economic growth and income distribution, but suffice it to say that evidence indicates that an increasing dependence on foreign investment is associated with lower economic growth rates and more unequal income distribution (Chase-Dunn, 1974; Baran, 1957), while increasing the income of the local elites and upper income professionals.

3. Our final example illustrating the broader aspects of the economic and social context of instructional technology concerns the Open University. The Open University is purportedly a relatively inexpensive solution for providing university-level training for large numbers of people previously denied such training. On the surface, this seems to contribute to increased growth (on the assumption that increasing schooling in the population increases the growth rate) and to economic justice, since now a larger portion of the population will have higher education, and particularly children of lower income families will now have access to jobs requiring university training.

However, some insight into this "opening" of the university through television indicates that there is no reason to believe that it will either contribute to growth or to a more equal income distribution or the reducing inequalities from generation to generation. The type of training given by the Open University, while it may produce equal test performance in certain subjects, does not, as we have discussed above, produce the same experience as Oxbridge or the Redbricks, nor the same certification effect, since those latter university situations represent a certification of social class as well as cognitive skills. Indeed, there is a puzzling trend reflected by the Open University concept that seems to be missed. Why should the latecomers to the university system—the children of working class parents—receive lower cost university education than the children of higher class parents? If Open University through television is so cost-effective, why have an Oxford or Cambridge or Sussex or University of London train any students at all? Simply taxing such inefficient institutions out of existence or cutting off state aid would force everyone to take their training in the same low-cost, televised manner.

The Open University seems to be the solution to pressures for university training for working class youths, but only for a university training which increases some competencies without necessarily providing credentials for higher paying jobs which are reserved for graduates from the "real" universities. We think that if a study were done following up on the Open University graduates, the results would show that they are in a relatively similar position to that of the graduates of *educación básica* in Salvador and that of the graduates of *Telesecundaria* schools in Mexico once that system expands: the kinds of jobs which have been available to university (or secondary) graduates in the past are not the kinds of jobs the graduates of television education are getting. Their pay will be lower, and their unemployment rate will be higher. This is not because their cognitive knowledge in certain subjects will be less than that of their counterparts; it is because they have not had the same social experience as the others, and it is because educational television has done nothing to counteract the class system which governs these societies. At the same time the increase in the supply of

persons with these educational attainments will far exceed the increases in job openings for these levels.

The three examples we have discussed above only serve to illustrate the essential point: educational media can be evaluated in terms of narrow educational objectives, but this ignores the overall role that educational media will play in affecting the welfare of the people subjected to it. If the educational objectives used to evaluate the effectiveness of media have little relationship to economic and social welfare, the evaluations are meaningful only in that they obscure the more significant effect that media may have in maintaining an economic or social system which is unjust and inefficient in terms of people's basic economic and political needs (Carnoy, 1975). This is not to say that teaching cognitive skills as effectively for less resource cost is not a worthwhile objective, but the economic and social effects of producing more of these cognitive skills will tend to be very small in societies which are not geared to utilize them in the economic and social system. To the contrary, the introduction of media (with all the fanfare which surrounds educational expansion through media) may serve to temporarily quell legitimate demands for social change and thus forestall that change. It is no accident that the largest ETV projects to date—in El Salvador and Ivory Coast—are located in countries which have very unequal income distributions; and that neither of these projects is, in practice, distributing schooling any more equally than it has been in the past. Furthermore, both societies are archetypes of dependent economic and social systems; indeed, for the most part, educational television has been organized to provide the types of skills which will foster even greater dependence through the increased need for foreign investment to employ the new workers produced by the expanded school system (Carnoy, 1975).³

3. In the Ivory Coast the top 5 per cent of income recipients receives about as large a share of the national income as the bottom 60 per cent, about 29 per cent of total national income for the former and 30 per cent for the latter. For Mexico the concentration of income is even more disproportionate with the bottom 60 per cent of income recipients obtaining only about 22 per cent of national income while the top 5 per cent receive almost 29 per cent. For El Salvador the comparable figures are 24 per cent for the bottom 60 per cent of the population and 33 per cent for the top 50 per cent. [See Adelman and

Finally, we feel that evaluators have totally ignored the effect that centrally controlled educational television, radio systems and video-cassettes (with classroom teachers trained only to dovetail into the media package) will have on the *diversity* of student experience and institutional exposure. Is it possible that such centrally controlled education systems are particularly appealing to authoritarian societies who wish to extend their control over the school curriculum and the school age population? We do not deny that schools are probably limited in their effect on political attitudes and even social values, but to the extent that teachers are given more freedom to teach what they wish and the way they wish, there is a possibility of reducing authoritarianism by increasing participation and the possibility for democratic social change. This is likely to be especially true in countries where a few

Morris 1973): 152.] An even more ambitious educational media project is planned for Brazil: that country is planning to adopt a fixed satellite system of educational radio in order to expand further its educational enrollment. Brazil's recent development, like that of Ivory Coast and El Salvador, is based on increased foreign investment dependence. And, despite an already rapid rate of schooling expansion and a large increase in national income, Brazil has experienced rising income inequality. According to Adelman and Morris (1973: 152) the bottom 60 per cent of income recipients in Brazil in 1960 received only 23 per cent of the national income while top 5 per cent received over 38 per cent. The distribution became even more unequal by 1970 (Langoni, 1973; Fishlow, 1972). The real income of the poor is said to have dropped by over half in the last decade as the result of inflation far outstripping the minimum wage (Homc, 1974). Moreover, there is some indication that in recent years the proportion of the national budget devoted to social services—including education—has shrunk.

The question that we wish to raise is how low-cost educational expansion is going to compensate for national policies that have created a decline in the real income of the poor in a country already characterized by profound income inequities and with one of the highest economic growth rates in the world. Is it possible that the advent of educational technology in Brazil has greater implications for the political socialization of marginal populations under the present military dictatorship than for either economic growth or more equal income distribution. Certainly, there is no indication that the present regime favour improvements in the distribution of income (Fishlow, 1972; Carnoy 1974b).

powerful people seem to feel that they have greater claim to the country's resources than the mass of people living on the land or in urban slums. If educational media contribute to inhibiting that social change, then evaluators must certainly rate that alongside increasing test scores for fewer dollars.

Rather than limiting our analysis of the media's impact on society to narrow cost-cognitive learning studies, we must understand the total role of media in the educational/social systems which they serve. For it is this total role that will determine whether governments adopt instructional media or not. Cost-effectiveness studies of the kind presented here will only act to *legitimize* these choices on the basis of criteria acceptable to those funding agencies and governments that have a vested interest in avoiding discussion of the larger agenda.

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Educational Technology in Africa

J.D.C. Osuala

In an attempt to define educational technology, it is pertinent to begin with a definition of the two words which comprise the term, namely "education" and "technology." Education refers to the general processes of learning that occur as a result of a wide variety of experiences occurring in formal or informal instructional situations.

The term "technology" was defined by Erickson (1970) as the tools of one's work which can be conceived of in the very narrow sense of hardware and machines or in the broad sense of theory and knowledge. The Commission on Definition and Terminology of the Department of Audiovisual Instruction of the NEA (Erickson, 1970) defined technology as a systematic body of facts and principles related to a comprehensive, practical and useful end. In line with its definition, the Commission noted that the principles of effective teaching exemplify a technology.

The term "educational technology" has been variously described as a systematic approach to the solution of problems in education (Freeman, 1979), or as the tools and techniques used in general learning situations (Levie, 1975). According to (Saka noto, 1980), however, educational technology is the creation of learning environments which are flexible, dynamic and capable of responding to a wide variety of needs and learning styles through the combination of human and non-human media.

A general working definition emerges from a synthesis of the above analysis and definitions. Educational technology, then, is seen as a systematic mode of designing, carrying out and evaluating the total process of learning and teaching in

terms of specific educational objectives through the use of media, personnel and actual experience.

Some experts in the field, however, make a further distinction between educational technology and instructional technology, which is often used synonymously with it. Instructional technology generally refers to the specific instructional techniques utilized mainly in formal, school-type learning situations, whereas educational technology refers to instruction and management and pertains to a wide range of learning situations. In both instructional technology and educational technology, however, educational media is given a prime place of importance in its function of facilitating learning.

Components of Educational Media

A wide assortment of media are commercially available or can be constructed and used as instrumentations in the achievement of the overall objectives of educational technology. These educational media can be representatively classified under the following headings:

1. *Print Media* include books, programmed texts, flash cards and games.
2. *Non-Projected Media* include chalkboards, photographs, drawings, charts, maps, bulletin, felt and magnetic boards.
3. *Silent Projected Media* include slides, filmstrips, overhead transparencies, silent films, microfilm, tachistoscopic and stereoscopic presentations.
4. *Audio-Media* include audiotape, records, compressed speech and telephone.
5. *Audiovisual Projected Media* include sound filmstrips, sound slide sets and sound motion pictures.
6. *Electronic Media* include videotapes (VTR), closed circuit TV, computerized retrieval systems used for computer-assisted instruction (CAI), word processing typewriters, etc.
7. *Realia* include models, kits, globes, specimens, etc.
8. *Mass Media* such as radio and television have been used for sometime for educational purposes. However,

their use for large and disparate populations differentiates them from the above mentioned media which are primarily utilized for small classroom groups.

All of the above media have their own specific functions; however, when they are variously combined through a *multi-media* or *cross-media* approach, more effective instruction is achieved.

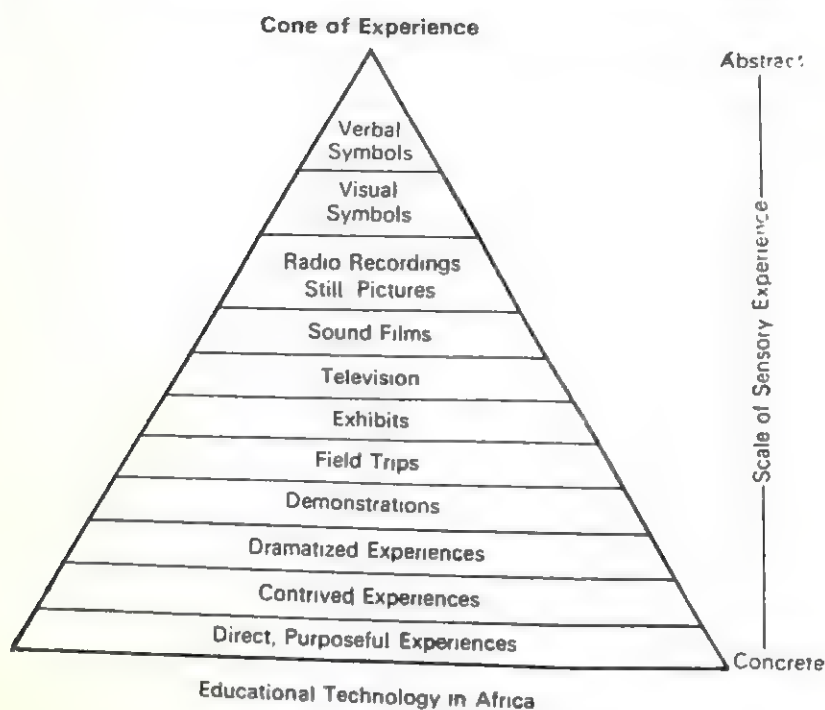
Purpose and Use of Educational Media

Educational media are used both as tools for teaching and avenues for learning. They include the things which are manipulated, seen, heard, read or talked about, plus the instruments which facilitate such activity.

The major reasons for using educational media are: (a) to provide meaningful sources of information in learning situations, (b) to extend the horizon of experience for the learners, (c) to provide interest-compelling introduction to a wide variety of learning activities, and (d) to overcome, for example by the use of the mass media, the physical difficulties of presenting certain subject matter.

Effectiveness of Educational Media

It is generally accepted that the overall goal of educational technology is to facilitate learning through a variety of means, of which the educational media described earlier figure prominently. It should be mentioned, however, that other means of facilitating learning can be utilized in educational technology, including the use of verbal symbols such as lecturing; use of field trips, demonstrations and experience of all kinds. Educational theorists generally agree that learning situations which involve the learner in sensory response and experience are the most ideal. Using Knowles' Cone of Experience, then (1976), it is possible to compare all of these media and modes of instruction by level of abstraction. As can be seen, audiovisual media such as sound films are more effective as teaching devices than, for example, lecturing or the exclusive use of the chalkboard. These media, however, tend to be more abstract and less involving than other more experimental techniques.



Two separate, but related concepts make up the idea of educational technology in many parts of Africa. The first is that it is synonymous in ordinary usage with the term "audiovisual media" or its newer derivative, "educational media" (which was discussed earlier) and which is used for the improvement of instruction. The second connotation of the term educational technology is the use of the electronic mass media, principally the radio, for the purpose of instructing large segments of the population simultaneously. This latter purpose is often achieved through a multi-media approach which utilizes correspondence/distance teaching methodology.

Two examples of the work of National Centres for Educational Technology may suffice to give credence to the preceding assertion. In 1978, the Federal Government of Nigeria established the National Education Technology Centre in Kaduna "for the purpose of providing services on audiovisual aids to schools in the Federation" (National Policy on Education, 1977). The staff of the Centre subsequently acquired a large stock of educational media

including more than 500 sound films, various non-projected media and realia for loan to schools. The staff conducts seminars on the making and utilization of educational media and also trains media specialists. They produce and coordinate the state production of daily radio broadcasts for primary schools and teacher training colleges, and have already provided free radios to most of these institutions. The Centre has been given the responsibility for the preparation of radio and television programmes for other populations as well, including adult education.

The second example comes from Ethiopia where the Ministry of Education in 1975 established a National Educational Technology Centre primarily for the production, dissemination and evaluation of radio broadcast programmes and support materials. The reason that educational technology was defined in Ethiopia in terms of the radio was because of the conviction that "the priority aspect of educational technology as an innovative input of the education system *is radio* . . . It has been found that (this) medium plays a most distinctive role as a catalyst in the educational process" (Unesco, 1978).

While the emphasis on educational technology in Africa is primarily placed on the use of educational media to achieve educational goals, human and environmental engineering and experiential methods are also utilized to a lesser degree to achieve the same ends.

Scope of Educational Media Available in Africa

As was mentioned above, there is currently a "transistor revolution" in which the radio is being used for educational purposes in many African countries. This is because the medium is readily available to all segments of the populace.

Other common educational media available for classroom use in Africa are discussed in a recent handbook on audiovisual aids for teacher education (Uto-Uko, 1979). These media include the chalkboard, books, maps, charts, pictures, specimens and models. The handbook gives a detailed explanation of the operation of the overhead projector, the opaque projector, the filmstrip/slide projector, the tape recorder, the sound projector and the record player. The

uses of open and closed-circuit TV and the potential use of videotape equipment especially for microteaching are also explored in the handbook.

Isolated instances of other more sophisticated educational media in Africa include foreign language laboratories, microteaching units, microfilm projectors and science equipment. Most of these are utilized in higher institutions for teaching purposes.

Sources of Educational Media in Africa

Educational media for classroom use are available from a variety of sources in some African countries. These include National and State Media Resource Centres, libraries and private agencies such as the British Council.

The functions of National Centres for Educational Technology were discussed earlier in regard to their production and distribution of educational media. State Media Centres have similar responsibilities. For example, the Modern Aids to Education Centre, Enugu, Nigeria, produces maps and graphs for schools in its Graphic Arts Section and builds learning aids and games from wood in its Woodwork Division. The Centre also has two overhead and three sound projectors and a stock of nearly 100 sound films which are loaned, generally to secondary schools, for two week periods.

The trend which started in Ghana in 1950 leading to the gradual establishment of children's libraries in Africa, is progressively taking hold in all regions. These libraries are generally located on university campuses, as is the Abadina Media Resource Centre, University of Ibadan, Nigeria, or in state or local government libraries. They are usually multimedia centres containing a wide variety of reading materials, slides, records, cassettes and films as well as educational toys. Puppet shows, film shows and story telling are regular features of the libraries. At times mobile libraries are attached, which extend the library's services to a wider geographical area.

The British Council, which has offices in 23 African countries, provides a number of educational services. Two of its major contributions in the way of educational media are the provision of children's resource libraries and the free loan of hundreds of sound films on English language,

literature, history, art, music, etc. The major users of these films are secondary and post-secondary institutions.

While all of the aforementioned media are available in Africa, their use is often restricted to the capital city or the community in which the above institutions are located. Lack of electricity, malfunctioning or non-existent telephones, chaotic mail services and unmotorable roads put their use beyond the reach of thousands of school children in the remote villages. Many of these constraints are being ameliorated, however, with the gradual provision of basic infrastructures like roads and electricity to rural areas.

Educational Technology in Africa's Educational Systems

Educational technology is involved with the design of educational systems which meet specific educational objectives. In the African context, however, these objectives never exist in isolation, but are directly linked with national objectives, such as economic recovery, national unity, rapid industrialisation, etc. Considering that more than fifty separate countries occupy the continent of Africa, and each one has its own unique linguistic, demographic, economic, environmental and political characteristics, one can safely conclude that there are quite a number of educational systems in Africa, each with its own type of educational technology.

Nearly all African countries have reformed the educational systems bequeathed to them by the colonialists. However, an examination-centred curriculum still exists, especially in some Anglophone countries. This system lays great emphasis on rote academic learning which obviates the use of sensory-stimulating educational media or an experience-oriented curriculum. Nigeria, in her new national policy on education, is breaking this mould slightly by replacing the primary school examination system with continuous assessment and by introducing vocational subjects as electives in the secondary schools.

Countries which have departed radically from the colonial model have created "New Schools" and an educational technology which stresses practical, life-linked functional education. For example, in Tanzania's primary and secondary

schools, work has become an integral part of the curriculum so that schools also function as farms and workshops, while factories, community centres and villages have become places of education. Benin has gone even further in adopting a functional system of education by making every school a cooperative production unit in which students are responsible for the management of their own schools. One could say that the educational technology which utilizes daily workrelated experiences, not only goes far to prepare students for their place in the society, but would also rate favourably as a mode of instruction on Knowles' Cone of Experience, described earlier in this chapter.

Common Educational Concerns of African Countries

Although African countries differ in many ways, they all place a great deal of importance on education in the belief that education is the key to development. They all set aside a substantial proportion of their budgets for educational purposes. Cooperative efforts between countries, such as the All-Africa Meetings to share ideas on common educational problems and programmes, have become a regular feature on the continent. The first was held in Addis Ababa in 1961 and the latest one was in Lagos in 1976.

There are growing numbers of educational specialists emerging from some parts of the continent, as well as sharing of expertise between countries. For example, in 1975, the Government of Swaziland was host to a group of curriculum development experts from Botswana, Ethiopia, Lesotho and the United Republic of Tanzania who had particular interest in the work of the Swaziland Primary Curriculum Unit. This seminar was remarkable for the interest it generated regionally in an innovative educational technology.

Other signs of interdependence and cooperation between African countries are seen in the determination of some countries, such as Togo, to design and manufacture all of their own teaching materials locally, or, at best, to procure them from neighbouring African countries.

One common educational concern shared by many African countries is the challenge posed by the staggering rates of adult illiteracy across the continent. In the Ethiopian example

used earlier, for instance, radio was the major expression of its educational technology because this medium alone could reach the adults, 90 per cent of whom were illiterate ! In many other African countries, the illiteracy rate averages 70 per cent.

Another shared problem is the inadequacy of trained teachers. In order to afford quality education to teacher-trainees, teacher training colleges are generally well-equipped and correspondence and multi-media technology are utilized to upgrade and retrain teachers already in the field, who lack formal training.

A recent phenomenon in many African countries is that the school-aged children constitute up to 30 per cent of the total population. Providing education for such numbers puts great strain on limited resources. Under these circumstances, educational media such as audiovisual aids are considered a luxury. President Julius Nyerere of Tanzania has this to say about the matter:

"The most appropriate techniques in a particular case will depend upon the circumstances and the resources of the learning community and of the nation in which it lives. For it is no good spending time and money on elaborate visual aids which need skilled operators and electricity if either the skilled operator or the electricity is lacking . . . It is no use relying upon techniques which need imported materials if you are working in a country which has a permanent balance of payments problem (Hinzén, 1979)."

At the university level, some African countries are facing a problem similar to that of Nigeria, where, for example, at the beginning of the 1981-82 school session, 6,000 qualified applicants were vying for only 80 openings in the Faculty of Law at the University of Nigeria. This situation can be multiplied by the number of faculties in each African university in countries where the higher institutions cannot cope with the enormous numbers of students graduating from the secondary schools each year. Many creative solutions are being found to this and other issues of lifelong learning, many of them centering

around the use of mass media technology combined with correspondence.

Case Studies and Examples of the Use of Educational Technology in Africa

Educational technology is used by African countries in the Herculean task of overcoming their educational problems. These problems centre around the provision of meaningful education to primary and secondary aged students, the structuring of adult and post-secondary education and the training of teachers. The modality employed to achieve these goals include the use of educational media and multiple media as well as through the praxis of human and environmental engineering.

Primary Education: In attempting to offer education to the large numbers of primary school children in Africa, it is not always possible to provide adequate classroom facilities, not to mention educational media. In fact, "it is not in all classrooms that one can be sure to find a teacher, a chalk-board and a recommended textbook" (Unesco, 1979).

Some countries such as Ethiopia, attempt to provide basic education to more of their children by providing classrooms, but furnishing only teachers with textbooks. Although in this situation the teacher is expected to use her "own ingenuity, imagination and creativity to make teaching materials," (UNESCO, 1978), it is very likely that she will instead resort to dictating notes to make up for the children's lack of textbooks.

In Nigeria, to launch the UPE scheme in 1976, the government provided 68 different types of teaching aids to every primary school, but with an unexpected outcome. Several research studies carried out between 1979 and 1981 revealed that the majority of these media had never been used. The causes were many: (1) no instructions or demonstrations had been given to the teachers on their use, (2) the subject matter of these imported aids was strange even to the teachers (for example, "wigwam" was used to illustrate the letter "W"), (3) there was no place to store or display the materials because the classrooms were overcrowded with children (the enrolment at primary level alone rose by

87 per cent between 1975 and 1976), (4) items in high demand were in critical undersupply (for example, only 3 word-building sets were provided to each school, to be used by as many as 8 different classes), (5) between 50 and 70 per cent of the rural teachers surveyed had received *no* formal teacher training, and therefore, could probably not have utilized the teaching materials supplied by the government under the best of conditions, and (6) the examination-oriented curriculum was not conducive to the use of such materials. The findings of this study indicate that educational media alone cannot be effective unless it is incorporated into a well-planned scheme of educational technology.

There are not many examples of the use of mass media for primary school children. Ivory Coast succeeded in installing one television set in every primary school as early as 1967. Nigeria, too, uses the electronic media, in the form of radio broadcasts to schools which are aired every weekday during school hours. The fifteen-minute programmes cover English, Social Studies, General Science and Home Economics. Teacher notes are sent to the schools a week prior to the broadcasts and one radio is provided to each school. The number of radios is not adequate and some schools do not include the programmes on their timetables; however, the service is available to all who wish to utilize it.

Teacher Training: Training teachers in the construction and use of audiovisual media is receiving more attention in some African countries. For example, under Nigeria's new national policy on education (1977), all teacher training colleges will be required to offer courses for all students on the use of educational media: professional specialist programmes for teacher librarians will also be offered, which will equip them to be educational media specialists. Other higher institutions offering teacher education will also be expected to include library and audiovisual education courses in their curriculum.

In order to train and upgrade untrained teachers in the field without removing them from their classrooms, many countries are developing an educational technology which utilizes extracurricular course units in conjunction with mass media and face-to-face contact.

In Ethiopia, teacher educators are responsible for the follow-up training of teachers. The teaching units used are supported by radio broadcasts which are transmitted regularly to mass media centres.

Nigeria, too, will train 30,000 untrained auxiliary teachers each year using 3,000 specially trained Field-Tutors. The teaching units will be prepared by the National Teachers' Institute and will enable the untrained teachers to eventually earn their Grade II teaching certificate.

Although Ethiopia and Nigeria have programmes for upgrading teacher programmes which are rather new, Kenya has operated a highly successful programme for the same purpose since 1969, using a well formulated educational technology. The instructional correspondence course units (CCU's), prepare teachers, and now others, to pass either the junior or senior secondary examination. The programme comprises a synthesis of the following elements—correspondence study guides, textbooks, teaching materials and experiment kits. Supplementary radio broadcasts cover the material on the study guides. Corrections are made on the students' work and occasional face-to-face teaching takes place during residential courses.

Research on the project has shown that teachers and others using the CCU's have performed as well as school candidates sitting for the same examination and better than private candidates studying on their own.

Although Kenya's form of educational technology for the upgrading of teachers and other adults may seem expensive, it is actually cost-effective, and as enrolments increase, the unit cost has been progressively lowered. The reason is that only 12 full-time staff, operating from one office building, are able to provide services to 10,000 students a year. The staff have the assistance of part-time course markers and writers and the use of secretarial, printing and broadcasting facilities to expedite their work.

Secondary Education: In many African countries, the cost of primary education and teacher training programmes take up half or even more of the total expenditure for education (Unesco, 1971). For this reason, there are limited funds available for secondary school programmes. Schools which

are self-supporting or which are financed by the communities are therefore preferred. The Tanzanian and Benin examples cited earlier are of this type. These schools are oriented to practical, functional education which will fit the students for occupations in the community.

Senegal, too, has a similar educational technology scheme for middle-level practical training of post-primary students. It differs from the other two examples in that the members of the local communities plan the programmes with the government, and also provide the training and absorb the students afterwards. The government started the programme in 1971 and has opened two centres to develop educational media and methodology to implement the programme.

Post-Secondary Education: One of the most widely utilized methods of meeting the needs of post-secondary school students in Africa is through correspondence education. Foreign firms and universities have offered such courses for some time, but there are now over 40 government-sponsored African institutions offering correspondence courses.

A notable example of such an organisation which uses correspondence and other new materials to teach techniques of farming, business and home management is the African Institute for Economic and Social Development (INADES), based in Ivory Coast. Founded in 1963, by 1970 it had students in Burundi, Cameroon, Central African Republic, Chad, Peoples Republic of Congo, Benin, Gabon, Mali, Niger, Rwanda, Senegal, Togo, Upper Volta, Zaire and Ethiopia.

To meet the demand for university education, the University of Zambia, the University of Lagos and the Centre d'enseignement Superior of Brazzaville are already offering degree courses through distance education. In January 1982, Nigeria is projected to introduce the Open University system, modelled on the British prototype. It will offer degree courses through the medium of a new educational TV channel, radio and other distance media.

Adult Education: Most African countries place a great deal of emphasis on educational technology for the structuring of adult education programmes. The impelling motive is

connected with the high illiteracy rates among the adult populations as well as the fact that:

“Adult education is a relatively low-cost area of education and from the point of view of return of investment, it is the most immediately productive and profitable for the national economy, since to educate an adult is to educate an immediate producer. (National Policy on Education, 1977).”

Educational programmes for adults are usually practical in nature; for example, literacy is often linked with work orientation so that the adults learn to read and at the same time they are learning useful skills such as cotton growing, cattle raising, etc. At other times, the programmes attempt to eradicate disease, poverty or social evils and to strengthen national unity.

The methods of delivery for Ethiopia's work-oriented adult education programme include a multimedia approach using local languages, radio, TV., face-to-face instruction and demonstration, rural newspapers and correspondence.

One very successful use of life-related educational technology using multi-media combined with face-to face encounters, took place in Tanzania from October 1975 to March 1976. The campaign had the following objectives: to inform adults of diseases caused by malnutrition, to convince them of the necessity of a balanced diet and to involve them actively in solving their health-related problems. It took nearly 18 months to write, print and distribute teaching materials, to train leaders and to organize the nearly 70,000 Radio Study Groups.

The Study Groups were originally composed of one million members, but before the campaign ended, nearly one million additional participants had joined. The Study Groups met weekly to listen to a special radio broadcast, then they read and discussed the relevant chapter in the book, and finally proposed practical solutions. Many group reports were broadcast nationally in order to disseminate their findings throughout the nation.

The participants responded enthusiastically to the radio

programmes and the attractively illustrated textbooks; however, the most tangible signs of the success of the campaign were the many projects which resulted afterwards. More than 700,000 new trilets were built through voluntary efforts as well as new vegetable gardens, poultry farms, day care centres and canteens, most of which were still operating on a self-help basis as late as 1979.

An earlier use of radio broadcasts to educate the rural adult populace in Senegal, in 1968, had an unusual outcome which expands the possibilities of this particular medium. The campaign was entitled, "Dissoo" (dialogue) and its purpose was to teach new farming methods and the diversification of agriculture. Eight hundred thousand farmers of one large ethnic tribe assembled in small groups to hear the broadcasts in their own language each week. As the lessons progressed, peasants were given the opportunity to voice their opinions over the radio. This innovation caused a considerable stir, especially when the farmers revealed many of the unethical practices of government officials involved in the distribution of fertilizers, etc. For the first time, the genuine problems of Senegalese peasants were made known directly to the government—through the utilization of the two-way.

In the above examples, educational media were utilized successfully in the implementation of the objectives of educational technology schemes. However, a very bold literacy programme in Somalia between 1973-75 using only the human resources available, went far to eliminate illiteracy in all segments of the country. To do this, it was necessary to create structures of education and educational technology which had never existed before.

The Somali people had common ethnic origins and language, but had been divided and ruled by two separate countries, Italy and England until 1960, when they were reunited as an independent country. From then, until 1972, lack of a common "official" language affected all aspects of communication in the country. In 1972, the Somali language was adopted as the official language, and, since it had never been written, a new orthography was adopted and taught to all school children and urban office workers.

In 1973, all schools were closed in a historic move, and

20,000 secondary school students and their teachers were deployed in the rural areas. Over 70 per cent of the total population is made up of nomads scattered over 650,000 square kilometres; so teaching them was no mean task. Nevertheless, at the end of the year, 785,093 of the 1,257,779 registered adults passed the literacy examination. As a follow-up, ten centres were established in nomadic villages, markets and other places frequented by the nomads.

In 1976, independent observers noted that for the first time, many adults in Somalia were serving actively on committees in the dense new network of local governments in the rural areas, and a vibrant new political life was evident throughout the country.

Thus, to sum up, educational media used to facilitate learning in Africa are available from federal and state educational institutions, libraries and private organisations; however, the immediate communities near these institutions profit more from their use than do schools in remote areas.

Because Africa is a continent of many nations, many types of educational systems exist there, but the two predominant forms are examination-centred and experience-oriented curriculum. All African countries promote education both individually and through mutual cooperation. They also share many common educational concerns, namely, high rates of adult illiteracy, inadequate supply of trained teachers, large numbers of primary school students and inadequate educational facilities for secondary school leavers.

African countries are creating educational technologies to deal with these problems which are characterised by the use of mass media, primarily the radio, multi-media methodology, judicious utilization of personnel, and by emphasising experiential, life-related, functional curriculum.

Educational technology in Africa has taken its own unique forms, created to cope with the multi-faceted educational problems on the continent. Results of the use of these new technologies are already evident in such countries as Tanzania, which had made "education for self-reliance" a reality. At the present rate of innovation in education, a proleptic glimpse into the year 2000 A.D. should witness a socially transformed Africa with a literate and skilled workforce, and a

healthy, knowledgeable and politically active populace. Education is, after all, an investment in human capital.

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Economic Analysis and Education: Critical Issues in Applications to Instructional Technology Evaluation

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I. THE ROLE OF ECONOMIC ANALYSIS

Over the last few decades, developing countries have confronted a growing set of interrelated problems relative to the utilization of their education systems to meet the perceived needs of national development. On the one hand, there has been a rapidly rising social demand for the provision of educational services, while at the same time, the cost of providing such services has increased rapidly. In many instances, resource scarcities (such as a shortage of teachers) preclude immediate satisfaction of this demand (in a traditional educational format) at what is considered an affordable price. Furthermore, the outcome of educational services that are traditionally provided are being increasingly questioned as to their relevance to national development. Finally, the inertia and inefficiencies inherent in most existing education systems create difficulties in responding to the problems mentioned above.*

Faced by these significant problems, many nations have attempted to experiment with variations from traditional educational practices. With the advent of technological advances in communications media, many countries have turned to these innovations as a basic element in the design of new instructional systems. In a broad sense, it is hoped that

*See Carnoy, 1976; Wells, 1976; Klees, 1975; and Coombs, 1968 for detailed discussions of these problems and their impact.

new technological approaches can contribute to advances in efficiency and productivity for the education sector, similar to those that have been attributed to technology improvements in other sectors of the economy. As Baumol (1967) has formally argued, and as Coombs (1968, p. 7) states more simply, "education's technology, by and large, has made surprisingly little progress beyond the handicraft stage."

Essentially, the point is that although the educational process has made little, if any, gains in productivity, most other sectors of the economy have. Relatively progressive industries, using the more advanced technologies, partially determine the salary levels that the less progressive industries will have to offer to attract competent people. Therefore, in general, educational systems have had to pay more over time for the same quality teacher. It has been the hope that innovations in instructional technology can aid the education sector in increasing its productivity along with the more progressive sectors of the economy. Relatively little of any potential such technologies have yet been realized. However, it is likely that the near future will bring increased traditional educational system costs (through rising real teacher costs) relative to instructional technology system costs (through reduction in or maintenance of the real costs of various technological alternatives), and thus the pressures to introduce these latter, more capital-intensive, techniques will be increased.

As such experimentation and plans for future usage increase, so do the demands for greater evaluation efforts, both as an aid to project specific decisions as well as to generate more generalizable information. A strong push toward greater rationality in the decision-making process has occurred in both the private and public sectors within the United States over the past two decades. Greater desire for sophisticated managerial training (hallmarked by Masters of Business Administration degrees and curriculum) and greater demands for accountability all have yielded increased interest in schema by which to analyze and evaluate.

Economics, more than the other social sciences, has been looked to provide more rigorous analytical approaches to practical problem solving. The dominant strain of current

Western economic thought has been well suited to play this role through the development of criteria and the provision of methodological approaches for the evaluation of alternatives. In particular, economists have brought a rather broad framework to systems evaluation of alternative educational strategies under the rubric of *cost*, *cost-effectiveness*, and *cost-benefit* analysis. While the primary emphasis of many other social scientists is on the effectiveness (the degree to which educational goals are met) of alternative educational systems, the voluminous findings of no significant differences in measured cognitive effectiveness among alternative instructional strategies (see Jamison, Suppes, and Wells, 1974) lead economists to place a heavy emphasis on system costs. However, while the overall conclusion drawn from effectiveness surveys is one of no significant differences, this result reflects an averaging process and, indeed, some studies do point to differences in effectiveness. A basic problem is that research has not been directed at uncovering the specific circumstances, types of learning, or characteristics of learners which would lead to more consistent findings. Faced with the potential for different strategies yielding different educational outcomes, economists turn to both cost-effectiveness and cost-benefit analysis to aid in the choice of an alternative.

The distinction between these two types of analysis is sometimes blurred, although this distinction is clear in a technical sense and centers on the difference between effects and benefits. Economists use "effects" to refer to the various dimensions of system outcomes with which one might be interested—in educational systems terms, examples would be student cognitive development, student affective development, the number of students the system enrolls, the number it graduates, etc. The term "benefits", on the other hand, refers to a *valuation* of these multidimensional outcomes so that all may be summarized in a single index such that the outcome index is directly comparable with the cost index used. This usually means measuring benefits in dollar terms (although other metrics are theoretically possible) and thus we have seen a number of studies looking at rates of return to educational investments in which the costs of the investment are compared with the future income (and industrial or

agricultural productivity) benefits that may be received by programme participants and by society in general.

In this paper we discuss what we consider to be some of the more critical facets of the present state-of-the-art of the application of cost-effectiveness and cost-benefit analyses to the evaluation of educational system alternatives. Cost analysis for instructional technology systems, an essential ingredient to the above two approaches, has been discussed in great detail in Jamison, Klees and Wells (1976). What should be recognized is that cost analysis alone can never yield criteria to serve as the *sole* basis for a rational decision; decisions require either information or assumptions about system outcomes as well. A reasonable substantial body of economic literature dealing with education from these perspectives has been developed, especially over the last decade and a half.

Many educators have rejected the work of these economists in education as too narrow, as focusing on only quantitatively measurable benefits and often only on those that can be measured in dollar terms. Their point of view is quite understandable in that there is an excess of "one dimensional" economics and the limitations of this type of analysis for policy decisions are apt not to be sufficiently stressed. Nonetheless, we do believe that the overall frameworks that different economists bring is useful to educational evaluation—most educational research focusses on short term effects, often to the complete neglect of examining both system costs and longer run individual and societal benefits. The economist's framework, on the other hand, stresses the analysis of costs, effects, and benefits in an integrated fashion in order to compare alternative system strategies and perhaps to discover which is most cost-effective or most cost-beneficial.

Again, we want to stress that what we consider most beneficial about economic analysis is that it can provide useful alternative conceptual frameworks for thinking about various aspects of the social system within which we live. It is important to remember that economics, like all other social science "disciplines", is an artificial partition of a simplified model of the world. Although anthropology, economics, psychology, and sociology may sometimes be descriptions of

the geographical divisions within many university buildings, they should be employed as reality partitions only to the extent that they are useful for thinking and doing.

In what follows, we briefly survey the approaches that economic analysis takes to educational evaluation and their limitations, with a focus on the application to instructional technology alternatives. We draw heavily on a lengthier treatment of many of these same issues that we have recently completed; for more details on many points, the reader is referred to Klees and Wells (1977). Instead of dividing this paper into separate treatments of cost-effectiveness and cost-benefit analysis, we have integrated them to some extent and divided the paper into what we consider to be the two major focal points for discussion in this field: the choice and treatment of the outcomes of alternative educational strategies that will be studied and the theory and methodology of relating system inputs to outputs. The points below are generally applicable to the relation between economic analysis and educational evaluation and will be discussed as such; for a more detailed application to instructional technology evaluation again see Klees and Wells (1977).

II. OUTCOME MEASURES

Much attention has been centered upon cognitive achievement, as measured on standardized tests, as the sole criterion of educational effectiveness. While this is an important process-outcome, it is by no means the only one of interest. Other effectiveness measures considered important include changes in: the distribution of test scores to determine potential reductions in educational outcome inequality; drop-out rates; repetition rate; analytic capabilities; creativity; inquisitiveness; and a wide range of social and economic behaviour. To a developing country expanding its educational system differences among systems in terms of the rapidity with which the school population can be reached are also of importance.

For non-formal education programmes such as those in community development or agriculture, one is also interested in imparting knowledge. However, there should be an even

greater interest in affecting the likelihood of fostering an ability to convert knowledge gained into action. The changes in agricultural production derived from the action would be considered to be a benefit. One might also be interested in creating a self-help or innovative capacity within certain population groups. A more direct, yet less satisfactory, effectiveness measure for non-formal education may be the size of the audience attracted to the programmes.

To make decisions about educational alternatives one must *evaluate* educational outcomes such as those above. Economic analysis contributes to this evaluation by providing frameworks and methods to approach the question of assigning value to these different outcomes of interest so their relative "worth" may be compared. A primary conceptual stress of conventional economic thought applied to education is to aggregate outcomes of interest by assigning monetary value to certain educational system outcomes and thus compare educational alternatives by weighing their monetary benefits against their costs. An alternative approach to this same question of aggregating outcome measures to a single index is also provided by economics, through the methods conventional economics uses to study individual choice. Below we discuss essential features of each of these two contributions to educational evaluation.

A. From Effects to Benefits

The key problem of cost-benefit analysis is in translating the alternative educational system outcomes under consideration into measures that can be compared directly with costs, so that the question, "Is this activity worth devoting these resources to it?" can be answered. The connections necessary to answer this question have been derived over the past two centuries (dating primarily from Adam Smith's, *The Wealth of Nations*, in 1776) by economists concerned with the operation of a capitalist economy, or the operation of a socialist economy according to competitive market principles.

According to this version of economic theory (there are others, which will be briefly discussed below), in a perfectly competitive market system the private sector of the economy produces those goods and services most valued by consumers

in that society, and in so doing, utilizes the nation's resources as efficiently as possible. One of the principal reasons for this supposed state of affairs is that businesses are hypothesized to maximize profits (other necessary behavioral *assumptions* of the system are detailed in any standard microeconomics text, e.g., Henderson and Quandt, 1958). The maximization of profits reflects a situation where the inputs utilized by a firm are priced on the market and, additionally, the outputs that they produced are priced on the market. If market prices truly represent *social* value (see Jamison, Klees, and Wells', 1976, discussion of shadow prices), profits in this theoretical system represent a signal to the producer that the output they produce is more valuable to society than the societal resources that are utilized in the production process.

Regardless of the extent to which this perfectly competitive world reflects fact or fantasy, one concern that has grown out of this system of thinking revolves around the means by which the public sector can make wise investment decisions. The private sector theoretically has profits to guide it as discussed above. However, public sector investments often involve the production of goods or services which are not directly marketed. How should a nation's government decide which alternatives before it are most socially valuable? The methodological procedure devised by economics to answer this question is cost-benefit analysis.

Cost-benefit analysis involves the valuation of the outcomes of public sector investment in monetary terms and the comparison of these benefits with the costs of the investment. As with profits as a guide for the private sector, cost-benefit analysis provides a criterion of social worth for investment decisions, again given that prices truly reflect social value. If the monetary benefits exceed the monetary costs, the investment is deemed worthwhile. The trick, of course, is to translate public sector investment outcomes, which are not directly marketed, into some monetary value equivalent.

In educational system evaluation most economists have taken the approach that although educational outcomes of interest are not measured in monetary terms, they can be translated, at least in part, into monetary outcomes since the main "products" of educational services, the students, enter the

labour market. The hypothesis made is that formal and non-formal educational experiences result in the embodiment of additional skills and traits in the individual, yielding "human capital," that makes the educated individual more economically productive, and, thus, increases the general productive capacity of the economy and thereby contributes to economic growth. If this additional productivity due to schooling can be measured, then one can compare a measure of the societal benefit in monetary terms with that of societal costs in monetary terms for a particular educational endeavour. Unfortunately, economic productivity is not easily measurable and the alternative most economists choose to measure is income. The connection between the two is again based on competitive market theory; in a *perfectly competitive* economic system the wage an individual receives is equal to the productivity that the person or the individual he adds to the firm. If this connection holds good (and it is far from clear that it does), then the additional income due to schooling is also a measure of the additional productivity due to schooling.

Empirically, economists have approached this cost/benefit evaluation of educational systems in four ways: through rate of return, production function, labour force planning, and social demand studies. Rate of return analysis yields measures of the individual and social return on investment in education through examining the relation of schooling to earnings. Production function analysis attempts to establish more direct connections between education and productivity. Labour force planning efforts use assumed relations between education and sectoral growth to yield guidelines for educational expansion. Social demand evaluation places reliance on the implicit value which the educational consumers place on educational services. All four approaches differ to some extent, and each has its relative limitations and strengths (e.g., see Blaug, 1970).

However, perhaps more critically, all of the above approaches rely on the assumptions of competitive market economic theory to yield the connections between educational outcomes and social value—chiefly that wages and prices reflect the value of social productivity. To the extent that

there are significant problems with this particular economic theory, the utility of the above cost/benefit methodologies is uncertain.

We view two basic problems with competitive market theory. First, it is clear that no real economic system operates strictly according to the few, but rather stringent, assumptions of perfect competition—profit maximizing producers, utility maximizing consumers, no individual buyers or sellers able to affect prices, free entry and exit from the market, etc. The critical question is what happens when the behaviour of the system deviates from these assumptions. Some theoretical arguments (in particular that of the “second best” solution—see Baumol, 1972, for a discussion) imply that when even small deviations from the assumptions of perfect competition occur, there is no saying whether the system operates at a state *close* to efficiency. Thus, prices and wages may *not* represent anything close to what a competitive market theorist would consider social value and thus the valuation of educational alternatives or any other investment decision by costs and benefits based on market prices will not automatically yield decisions that are socially wise.

A second quite important theoretical and empirical criticism of this system of thought has to do with the assumption that competitive market economic theory is in some sense almost “value-free.” The primary value claim that is specifically acknowledged is that labelled consumer sovereignty: that is, consumers preferences should direct the allocation of resources in society. This may be considered a reasonably desirable property of a social system by many, but one crucial question is where do these preferences come from? Competitive market theory implicitly assumes that the formation and development of individual preferences is not related to the economic activities of the society. This is unlikely to be true—educational activities are a clear case in point (see Gintis 1974, 1969). The question then becomes whose preferences, and preferences at what point in time will guide resource allocation decisions.

A related issue concerns the weighing of these consumer preferences that are guiding production decisions. How do these preferences become aggregated? The theory of perfect

competition essentially yields the rule of "one dollar, one vote." The preferences of those who have the most money exercise influence over what goods and services are produced by society in direct proportion to their greater wealth. To a large extent, competitive market theory ignores any such equity considerations.

These latter points raise questions that are difficult for cost-benefit analysis, to deal with, as presently formulated. The economist's concept of "society" as some abstract entity that receives all the benefits and incurs all the costs of any particular investment activity is called into doubt—first, because "society" as an aggregate of individuals has different preferences at different points in time that are affected by its earlier resource allocation decisions; second, because "society" consists of individuals and groups with unequal power and thus total benefits exceeding total costs will not necessarily prevent some individuals or groups from being hurt by a decision*; and third, in a more realistic view, because unequal power exists decisions may be made for which total benefits are less than total costs as long as the costs are imposed on a different group than that which receives the benefits.

The two problems discussed above, taken together, form a critique that questions the basis of most Western economic thought and consequently that of the cost-benefit analytic framework that is most commonly used. First, it is not clear that monetary values represent societal values and second, it is not clear what "society" as an aggregate concept really means.

Alternative economic viewpoints have been advanced, perhaps the most coherent centering around the works of Karl Marx and subsequent additions to the theories he initially expounded. Bowles and Gintis' (1975) *Schooling in Capitalist America* and Martin Carnoy's (1974) *Education and Cultural Imperialism* provide an application of such thought to the analysis of educational systems. A primary conclusion

*In theory, it is assumed that if total benefits exceed total costs of any activity, then that activity should be undertaken, since those individuals who might be disadvantaged by the activity could be compensated and thus all persons would benefit, or at least not be hurt. In practice such compensation is usually unlikely to occur.

of this literature is that educational system changes cannot, by themselves, resolve any of the most pressing societal problems—e.g., inequities of wealth and power, widespread alienation, severe poverty in developing nations, etc., but what is needed is a basic restructuring of the national and international economic system (see Carnoy and Levin, 1976, for a good discussion of this point).

No definitive prescription for cost-benefit analysis comes out of Marxist thought (cost-benefit analysis in its broadest meaning is still sensible as it simply refers to a basic rationality in decision-making), nor do the criticisms of the competitive market model yield a clear solution to remedy its deficiencies as presently applied. However, at least two general points do seem to emerge. First, one should be as much concerned about costs and benefits to different individuals and groups of individuals as to the "society" as a whole. Second, less concern should be directed to translating educational outcomes to monetary units. Alternative conceptions of development and economic progress can perhaps yield outcome measures that consider a wide range of social effects, incorporating impacts on equity, balance of payments, local or national autonomy, leadership, and other areas of societal interest. However, multiple outcomes in different metrics bring us back to the question posed earlier of aggregating different effects within a cost-effectiveness framework.

B. Alternative Aggregations of Outcomes

Apart from an extensively developed framework that looks at questions of social efficiency, economists also bring a set of technical approaches to combining multiple educational outcomes or outcomes that occur over a period longer than one year. As most commonly utilized, cost-effectiveness analysis does not go beyond the stage of determining the impact of alternative strategies on the criteria of interest. It is left to the decision-maker to implicitly evaluate the overall worth of each alternative, presuming that one does not automatically dominate, and then make her/his decision. However, from the point of view of instigating the decision-maker to think through the effectiveness tradeoff more carefully and to allow these tradeoffs to be scrutinized by other decision-makers and

public interest groups, it can be useful to employ techniques which bring out these tradeoffs explicitly.

Economists would examine outcomes (and costs) over time from the perspective that positively valued outcomes that occur in the present are valued more by the individual and the society than if the same outcomes were to accrue sometime in the future (and that dollars spent today are worth more than the same amount incurred in the future). To the extent that this is true, if different educational strategies have a different incidence of effects (and/or costs) over time, they may be valued quite differently, even if they have similar effects (and/or costs) in the aggregate. Jamison, Klees, and Wells (1976) detail a method for looking at the average cost of a project (a *cost-effectiveness* measure really, not a cost measure, with students or viewers enrolled or graduated as the outcome measure) that discounts the time pattern of student enrollment by a social interest rate, while Klees and Wells (1977) discuss the same concept in a more general cost-effectiveness framework. A significant problem is choosing an appropriate discount rate.

There are alternative methodological means of aggregating several outcome measures (see Easten, 1974). Generally, such methods involve having the decision-maker convert all outcome measures to a common numerical scale with interval properties and then assigning relative weights to each equally scaled outcome measure. Two of the more serious limitations of this technique for treating multiple effectiveness criteria are: the reliance on the subjective value judgments of the decision-makers and the potential effect of ignored criteria on the decision. Economists tend to prefer transformations to monetary amounts because of the alleged objectivity of the price system. However, there is nothing inherently wrong with subjective judgments, and there may be no escape from them anyway, as we discussed previously. The difficulty is that the decision-maker must somehow judge the relative worth of change in different criteria. Pessemier (1966) describes a technique similar to the above, but which attempts to transform outcomes to a monetary metric in which the decision-maker asks questions of the sort: "How much more money would I be willing to spend to achieve the following change in

the criterion of X?" Perhaps more development along these lines would be helpful.

The second limitation in some way is even more serious. As the analytic difficulty increases with the number of criteria chosen for analysis, the decision-maker utilizing the technique described will eliminate many criteria from consideration. It is important that this elimination be of the criteria which are considered less valued, rather than those criteria which are difficult to analyze. Furthermore, it is important to be rather comprehensive in your initial conception of what effectiveness criteria are relevant to this decision, especially taking into consideration effects that may be unintended but socially valuable or detrimental nonetheless.

III. RELATING INPUTS TO OUTPUTS

In the discussion of how an economist looks at educational outcome measures have, we have ignored the critical question of translating system inputs to system outputs. In Part II, we discussed a theoretical efficiency framework (see Klees and Wells, 1977, for a detailed analysis of efficiency concepts) that economists bring to educational evaluation in the form of cost-effectiveness and cost-benefit analysis—efficiency in the sense of allocating resources to those activities whose value is somehow judged to exceed their cost (either through aggregation by prices or by decision-maker judgements). We also discussed some of the more significant problems in making such efficiency judgments, even if information about the costs and outcomes of alternative educational strategies were available. In this part of the paper, we look at whether, even assuming the efficiency framework of most economists is a reasonable one, the empirical investigation techniques currently available to social science are capable of shedding light on casual input-output relationships.

The economists' approaches to both cost-effectiveness and cost-benefit analysis require answering such questions as, how do educational resources affect educational outcomes of interest, such as cognitive achievement of various types? How much of income differences between individuals are actually

caused by differences in education? How much of the productivity differences between workers or farmers with different educational levels are actually caused by those educational differences? What specifically does education do that can yield any income or productivity differences that do exist? How does consumer demand for education react to changes in the price of that education? The classic scientific response to questions of impact (that is, to questions of causality), the experiment is often politically or practically difficult to accomplish with much rigor and the assignment of cause to some broad "black box" treatment labelled "education" or "new educational strategy" is usually somewhat ambiguous. This is due, in part, to a growing concern for practical (as opposed to statistical—see discussion below) significance which brings even the proper form of the experiment open to question (e.g., whether to use identical budgets, identical materials, or design the best pedagogical strategy for each educational alternative).

The lack of possibilities for structuring what science considers rigorous experimental tests to examine the impact of education, or of alternative forms of education, has led many social scientists to embrace recently developed statistical methods to analyze non-experimental information collected in the "field". The growing literature on educational production functions, educational demand functions, earning functions, and agricultural and manufacturing production functions, attest to the dominance of regression analysis as the principal method for such empirical investigations.

For regression analysis (or its related methods—e.g., analysis of variance, partial correlation analysis, or path analysis) to generate accurate answers to these questions, at least three principal conditions must be met. There must be a theory that specifies a complete causal model, one that includes all the relevant casual variables. The concepts one is trying to relate must be quantified and, moreover, quantified in a fairly rigorous manner, such that differences between variable values are meaningful (i.e., an interval scale—many commonly used variables do not meet this test, such as occupational status or socio-economic status). Finally, this theory must indicate exactly in what manner these variables

are related to each other (e.g., linearly, exponentially, logarithmically, etc.).

It is likely that the above conditions will not hold in answering any of the previous questions raised. For example, our theory as to exactly why and how achievement or earnings differ from individual to individual is weak at best and offers little basis for selecting other than a grab-bag of variables and using a linear functional form (see Bowles, 1970, and Psacharopoulos, 1974, for a review of this educational production and earnings function literature, respectively). Our knowledge of production relationships in manufacturing and agriculture may be somewhat better, but not very much. Our theory as to exactly how and why consumer demand for any good is influenced is also not very refined.

To the extent that the conditions necessary for regression analysis techniques to give an accurate portrayal of causal relationships are not met, the question that follow is how inaccurate will the results be? There does not seem to be a clear-cut answer to this, even in theory. There seems to be a tacit agreement among most social scientists to place less faith in the magnitude of the regression coefficients than in their sign. That is, all that is usually claimed is that one variable has a positive or negative (as opposed to no) influence on a dependent variable of interest, as opposed to claiming that a one-unit change in one variable will cause 'x units' of change in the dependent variable of interest. Unfortunately, it is this latter claim that is necessary to estimating the benefits of educational investments. Furthermore, some of the problems with regression analysis may lead one to doubt if even the sign of a variable's coefficient is correct, which may explain why educational production function analyses in the past have had a considerable amount of inconsistent results.

Nonetheless, the above considerations notwithstanding, we cannot make a decision without either assuming or determining something about *causal relationships*. Rational decision-making rests on comparing the projected costs and consequences of possible alternative strategies of action. The relevant question then becomes, do quantitative empirical investigations of relationships add something to our individual

or collective common sense judgments?*

Most social scientists would clearly answer this question affirmatively; the expectation is that replication of studies on different samples has, to some extent in the past and will again in the future, yielded some generalizable, consistent results that can serve to inform decisions. The principal caution is, given the methodological problems above, that common sense, experience, and judgment be used to interpret such quantitative findings. Still, the above considerations merit more debate on these points.

In conclusion, there are a few important points that should be mentioned and a few tentative conclusions that should be drawn out of the total analysis.

First, an obvious difficulty with both cost-effectiveness and cost-benefit analysis as usually practised is the bias towards those criteria that are most easily quantifiable. This bias leads to a failure to consider outcomes that may be valued, such as social integration or social equity, but for which the decision-maker finds it difficult to discriminate among the effects of various alternatives. It should be recognized that these economic frameworks do not necessarily, in their broad sense require quantification—they only require that the decision-

* There does exist a growing body of very recent literature (building, in part, philosophy of science precepts) that is asking these types of questions. For example, Crain and York (1976) question the efficacy of field study methods over experimental methods, even for large scale social programmes. However, even the utility of the experiment is questionable. Starr (1974), in an article that looks at "the edge of social science," discusses the "ideology of the positivist hedgehogs in social science," who never deviate from a straight and narrow, but distorted (according to Starr), view of empirical science. A view that allows quantitative "data" to, "like the shadows in Plato's cave . . . become more real than the world itself." (p. 409) The repudiation of other forms of discourse, the neglect of validity in pursuit of reliability; the reification of data as things-in-themselves; the illusion of false precision—these are not by any means necessary aspects of empirical science. But they are frequent enough to warrant mention. (p. 410) Cohen and Garet (1976) and Phillips (1974) discuss similar problems and also call for new forms of discourse (ones that recognize other forms of observation and evidence than that provided by significant coefficients) among researchers, as well as between researchers and policy-makers. Cohen and Garet suggest funding competing political views to undertake the same evaluation.

maker *conceive* of his/her decision in terms of a comparative weighing of the costs and effects or benefits of alternative policy strategies. It should be noted also that the development of techniques to quantify nebulous concepts and incorporate them into a decision analysis framework (e.g., see Pessemier, 1966) may be fruitful.

Second, even given the penchant toward quantification, there appears to be an undue emphasis on cognitive outcome assessment. It is usually implicitly assumed that the learning of cognitive skills is the chief mechanism by which education contributes to individual and societal productivity. However, a number of writers have recently suggested and presented evidence to support the possibility that there are affective and/or certification effects of the schooling process that may be more relevant to employment and productivity than cognitive skills.

Gintis (1971) argues that economic benefits are to the schools' role in forming work attitudes necessary to production. Furthermore, Gintis argues that these attitudes are basically those that conform to a hierarchical mode of capitalist production—punctuality, obedience to authority, and lack of creativity for those destined for lower rung positions and limited creativity and discretion within a framework of working primarily for extrinsic rewards, for those going to higher level positions (see Bowles and Gintis, 1975, for a discussion). Arrow (1973) and Spence (1973) view that the education process may actually have little or no value in developing economically productive capabilities in individuals, but may serve only as a filtering mechanism that allows those who already have greater productive ability and motivation to pass through and be more readily identified by employers. Berg (1971) also argues that the school is primarily a certification mechanism, but goes on to suggest that even the labelling process may not have any economic worth because employers engage in conspicuous consumption of school graduates (that is, employers are willing to pay higher wages to graduates than non-graduates even though the former may not be any more productive than the latter). If Arrow, Spence, Berg, or Gintis are essentially correct, the stress on cognitive outcomes as a measure of educational project success has

perhaps been vastly overemphasized.

Third, throughout this paper we have emphasized the analysis and effectively ignored the analysts. Carnoy and Levin (1975), in an article, that is directly focused on research efforts related to the economic analysis of instructional technology alternatives (but has wider application), spend a considerable amount of energy looking at the potential effects of who is doing the analysis. In particular, they apply the first "law" formulated by James Q. Wilson (1973) in his article about policy evaluation.

First Law: All policy interventions in social problems produce the intended effect—if the research is carried out by those implementing the policy or their friends (Carnoy and Levin, 1975, p. 387).

Carnoy and Levin argue that much of the research undertaken to evaluate instructional technology alternatives is sponsored by agencies that have a vested interest in the technology projects themselves. These agencies are hypothesized to choose researchers who often have an implicit bias in favour of the technology and tend to structure the evaluation so as to give the "benefit of the doubt" to the technology alternative.

Such an intimate relation also creates possible handicaps for a balanced evaluation. First, the close professional and personal association with personnel of the sponsoring agency can lead to an evaluator's self-identification with the project and a subconscious unwillingness to be critical or negative about the project's performance. Second, the close relation with the sponsoring agencies can further hinder a truly critical perspective and limit the evaluation only to those issues which are important to the agency footing the bill (Carnoy and Levin, 1975, p. 387).

To the extent that this is true and that such biases markedly affect the results of an analysis, this is clearly a very serious concern.

Carnoy and Levin, in the same article, also acknowledge

that Wilson's (1973) second "law" may apply to them, as the "law" states:

Second law: No policy intervention in social problems produces the intended effect—if the research is carried out by independent third parties, especially those skeptical of the policy (p. 387).

Both of Wilson's "laws" together raise the same two essential questions that have come out of the total analysis above. First, as regards conventional economic analysis in particular, is competitive market theory a reasonable framework on which to base educational analysis, or is it simply a reflection of ideological prejudices? Second, how much can the empirical methods available to social science discriminate among competing cause-effect hypotheses about how the world actually works? Our intention is not to berate social science nor to despair of progress. Our intention is to stimulate discussion of what we consider to be the most basic issues of economic analysis applied to educational evaluation.

Two tentative strategies are offered as coming out of our consideration of the two questions above (in addition to our recommendations earlier to look at costs and benefits for different population groups and to be concerned with developing a wider array of effectiveness measure than currently studied). First, perhaps research activities should be carried on and utilized at a much more micro level than is presently the case. That is, part of the reason for insignificant or inconsistent research results may be due to trying to generalize relationships that are simply not generalizable. For example, the factors that most affect learning within one particular school environment may not be relevant to another. If this were true, it would imply that both decision-making power and research and decision analysis capabilities be much more decentralized than they are now.

Second, we should be aware that most social science today, and the common approaches to cost-effectiveness and cost-benefit analysis are no exception. It emphasizes the effects of the characteristics of individual actions and often ignores

totally the influence that the properties of a particular structural system has*. As an example, a great deal of effort has been expended via educational production functions to examine the characteristics of students and teachers that affect cognitive learning. However, probably the major policy variable which will affect student cognitive learning is the choice of a curriculum. The "no significant difference" finding in the literature that compares alternative instructional technologies indirectly supports this view. Walker and Schaffarzick (1974) review of the empirics of the curriculum theory literature, points out the commonsense conclusions that if subject matter is included in the curriculum (as opposed to excluded from) students will learn it better, and the more it is emphasized the better it is learned. While this may seem trivial at first, it is likely that the greatest policy leverage that we have over what is learned is via what is included and emphasized in both the overt *and* the hidden curriculum. Consequently, the investigation of those structural properties of an educational and socio-economic system that determine the nation's curriculum should deserve; at the very least, equal weight with research directed toward the effects of differences between individual characteristics within that structural system. This same point can be applied to almost any facet of social science research in general, and to educational research in particular.

Finally, we should recognize that there exist competing descriptions of the social reality we live in, and that what we have discussed indicates that the analysis of system costs, effects, and benefits depends in part on the description of the world we choose. The distinction between decisions made for "political" reasons and that for reasons of "economic rationality" may be less a distinction on the basis of rational decision-making (for both may or may not be rational), but more a distinction along the lines of what specific goals are being sought after, how one evaluates benefits divided among competing interest groups and, in general, who has what

*We are indebted to Rose K. Goldsen, a sociologist at Cornell University, for consistently bringing this point (and others) to the forefront of our attention.

degree of control of the relevant decision-making power. Economic analysis is most useful to the extent that it makes decision-makers more aware and more explicit about alternatives and their various consequences. But, again, such analysis should not be taken as definitive, but as informative, to be interpreted with caution and common sense, based on the knowledge of both its strengths and weaknesses.

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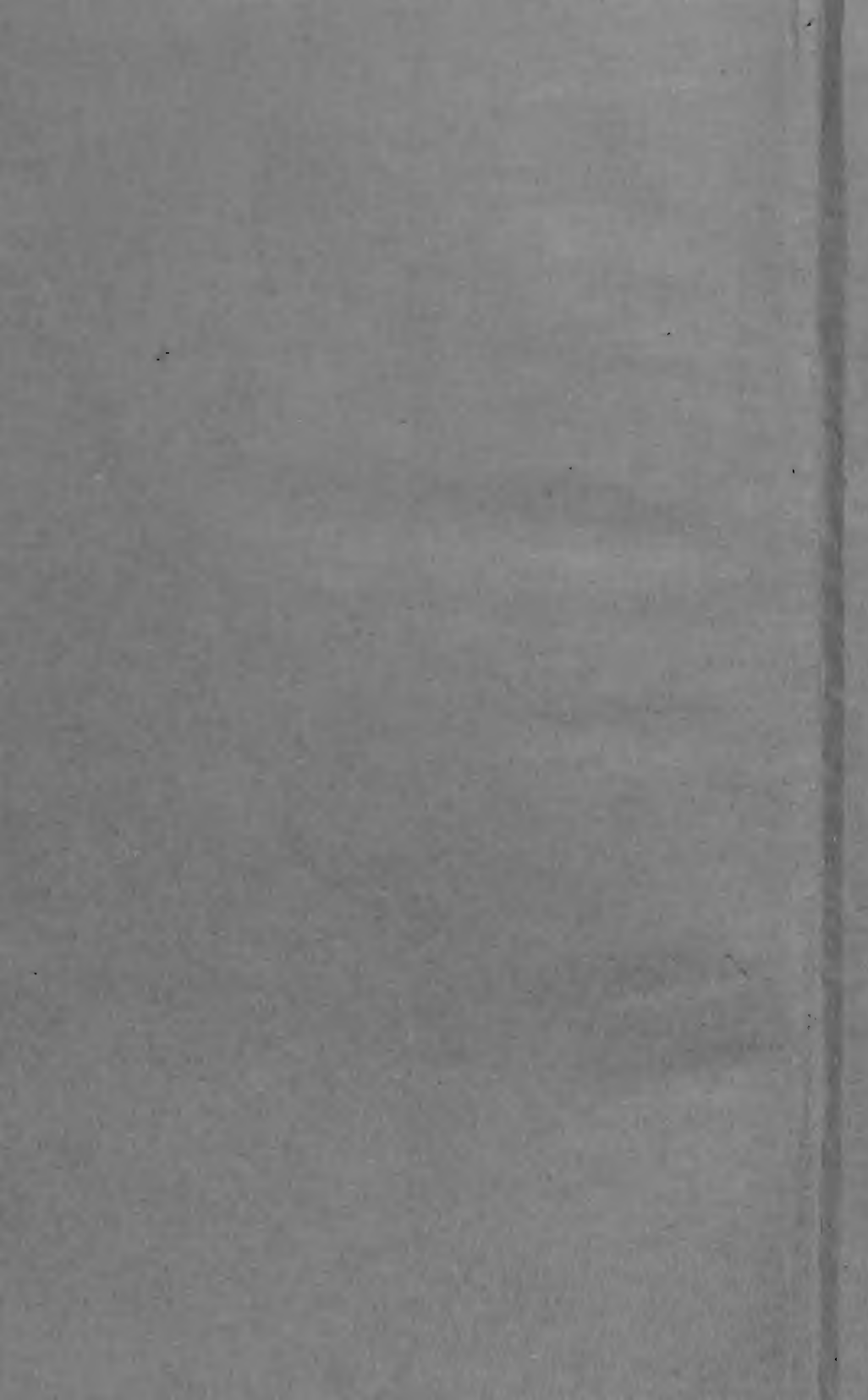
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